NASA SP-7011 (30)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (30)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

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A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during October, 1966

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **NOVEMBER 1966**

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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c. LC entries identified by a number in the A66-80000 series.

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(continued)

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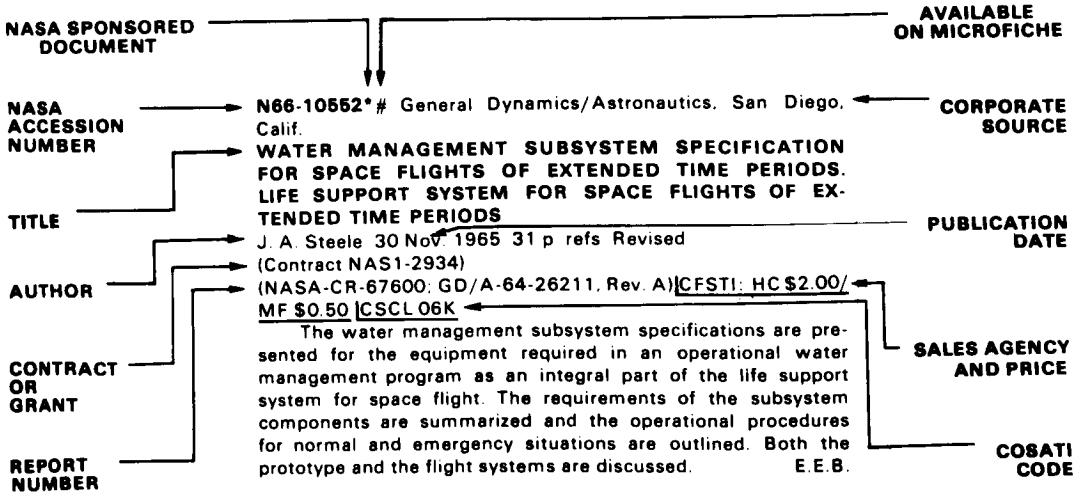
TABLE OF CONTENTS

TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography NOVEMBER 1966

STAR ENTRIES

N66-32686# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BASIC QUESTIONS OF THE ELECTROPHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM COLLECTION OF ARTICLES

A. F. Makarchenko, ed. 21 Feb. 1966 248 p refs Transl. into ENGLISH of the book "Osnovnyye Voprosy Elektrofiziologii Tsentral'noy Nervnoy Sistemy" 1 Kiev, Izd. AN UKR. SSR, 1962 p 1-232

(FTD-MT-65-210; TT-66-61264; AD-633030) CFSTI: HC $6.00/MF $1.25

CONTENTS:

1. GENERAL QUESTIONS OF THE ELECTROPHYSIOLOGY OF THE NEURON P. G. Kostyuk p 1-26 refs (See N66-32687 19-04)

2. ELECTROPHYSIOLOGY OF RETINA NEURONS A. L. Byzov p 27-38 refs (See N66-32688 19-04)

3. ELECTROPHYSIOLOGY OF NEURONS OF THE SPINAL GANGLIONS OF FROGS A. A. Lev p 39-74 refs (See N66-32689 19-04)

4. PRIMARY RESPONSES OF THE CORTEX OF THE CEREBRAL HEMISPHERES A. I. Roytbak p 75-99 refs (See N66-32690 19-04)

5. CERTAIN PECULIARITIES OF INITIATED ELECTRICAL POTENTIALS OF THE CORTEX OF THE LARGE HEMISPHERES V. V. Artem'yev p 100-113 refs (See N66-32691 19-04)

6. SECONDARY BIOELECTRIC REACTIONS OF THE CORTEX OF THE LARGE HEMISPHERES K. M. Kullanda p 114-161 refs (See N66-32692 19-04)

7. NATURE OF BACKGROUND RHYTHMICS OF THE CORTEX OF THE LARGE HEMISPHERES Ye. N. Sokolov p 162-196 refs (See N66-32693 19-04)

8. CERTAIN FACTORS DETERMINING CHANGES OF RHYTHMS OF ELECTROENCEPHALOGRAMS Yu. G. Kratin p 197-209 refs (See N66-32694 19-04)

9. MECHANISMS OF CHANGE OF BACKGROUND RHYTHMICS OF LARGE HEMISPHERES L. A. Novikova p 210-240 refs (See N66-32695 19-04)

N66-32687# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

GENERAL QUESTIONS OF THE ELECTROPHYSIOLOGY OF THE NEURON

P. G. Kostyuk *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 1-26 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

The general properties and different electrical activities of neurons are discussed with emphasis on the nature of electrical polarization and the electric activity of a nerve cell. The nerve cell is regarded as a mechanism of synaptic action that reacts differently to exciting and inhibiting phases where a section of the cell's region of axon exit generates the first impulse. Data on inhibition in motor neurons seem to be connected with a selective increase of their membrane permeabilities to potassium and chlorine ions. Electrophysiological properties of brain neurons include a predisposition of interneurons to stable rhythmic activity and to generation of high-frequency discharges at low thresholds of synaptix excitability. G.G.

N66-32688# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ELECTROPHYSIOLOGY OF RETINA NEURONS

A. L. Byzov *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 27-38 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

Nonpulsed signal transmission by photoreceptor rods and cones of fish and frog retinas were analyzed and compared with experimental results obtained through utilization of liquid microelectrodes. Hyperpolarization appeared in response to illumination after a rest potential of 30 to 40 millivolts, and disappeared only after the light was turned off. The height of the response depended on light intensity and attained 20 to 25 millivolts at large brightnesses; no pulsations were noticed. Electron microscopic intracell recordings of the various retina cell reactions found no potential differences between rod and cone responses to stimulation. It was concluded that the impulses were probably generated in the ganglionic cells and transmitted to the CNS by neutrons. G.G.

N66-32689# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ELECTROPHYSIOLOGY OF NEURONS OF THE SPINAL GANGLIONS OF FROGS

A. A. Lev *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 39-74 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

Isolated sciatic nerve preparations of frogs together with spinal ganglion pairs, kept in saturated Ringer solution, were tapped for their potential motor neuron current production by pyrex microelectrodes. Rhythmic stimulation of the nerve produced the disappearance of the S-component but rarely blocked

the potential of the non-myelinized segment for intracellular leads; during extracellular tapping, the block appeared not during transition from the myelinized to the non-myelinized part of the axon, but during the approach to the soma of the cell. G.G.

N66-32690# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PRIMARY RESPONSES OF THE CORTEX OF THE CEREBRAL HEMISPHERES

A. I. Roytbak *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 75–99 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

Cortex reactions to a volley of impulses were studied on the basis of changes in the electrical fields during excitation of parts of the pyramidal neurons. The appearance of negative potentials in the primary response (PR) was attributed to impulsive neutron discharges from brain tissue layers IV and III; but the amplitude of the negative potential did not reflect the real quantity of excited neurons since not all had axonal connections with surface layers. Reduction of the positive potential during heightened excitability of the cortex was explained by the fact that local potentials were broken in the pyramids during acceleration and intensive discharge. G.G.

N66-32691# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CERTAIN PECULIARITIES OF INITIATED ELECTRICAL POTENTIALS OF THE CORTEX OF THE LARGE HEMISPHERES

V. V. Artem'yev *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 100–113 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

Initial electrical reactions from the cortex of the large hemispheres of anesthetized and nonanesthetized cat brains showed that in both the sicipital and the motor regions complicated oscillations appeared. Sound, light, irritation of the sciatic nerve by electrical current, all caused in the sensorimotor region electrical reactions which varied in latent periods depending upon the place of registration of the potentials. It was concluded that the sensorimotor region of the cortex of the hemispheres constitutes a center of activity for different analyzers of both the external and the internal organism. G.G.

N66-32692# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SECONDARY BIOELECTRIC REACTIONS OF THE CORTEX OF THE LARGE HEMISPHERES

K. M. Kullanda *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 114–161 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

Non-primary induced bioelectric potentials in the cortex of large brain hemispheres (CLH), that appear after a response volley (PRV), were attributed to secondary generalized reactions of recticular stem or thalamic origin, and to those secondary local reactions associated with thalomocortical, associative cortical-cortical, secondary callosal, and early negative reactions. A brief overall review on bioelectrical response experiments with narcotized and nonnarcotized animals was given that emphasizes the difference between reticular stem stimulated responses and local responses. It was established that the electric negative response is extremely sensitive to narcosis. G.G.

N66-32693# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

NATURE OF BACKGROUND RHYTHMICS OF THE CORTEX OF THE LARGE HEMISPHERES

Ye. N. Sokolov *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 162–196 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

The origin of spontaneous brain rhythms and their connection with dynamic reflexes of nervous processes are studied by microelectrode measurements of electrical cortex oscillations. Various results on background rhythmics of the cortex of the large hemispheres are briefly reviewed and theories depicting slow brain waves as neuron excitation motions, and as dendritic potentials are developed. Light stimulation experiments seem to establish the slow potential as a change of the interneuron medium in reaction to an arriving irritation and thus represent reflexly adjustable oscillations of the ionic medium composition in which the nervous elements are located. It is concluded that the functional state of neurons is expressed indirectly in slow rhythmics through the properties of the homeostatic regulator of excitability in the cortex. The ionic composition of the interneuron medium affects the fineness of sensory functions and the quality of conditioned-reflex activities. G.G.

N66-32694# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CERTAIN FACTORS DETERMINING CHANGES OF RHYTHMS OF ELECTROENCEPHALOGRAMS

Yu. G. Kratin *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 197–209 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

Cat EEG responses to stimuli of different signal value were analyzed. The three factors that determined the change in background rhythmics were: brain structure, the current functional state of the brain, and the quality of the stimulus. The more complicated the given stimulus was, the more was the analyzer system activated and the brain reaction intensified. It was concluded that electrographic generalized reactions of the brain reflected the activity of its analyzer system. G.G.

N66-32695# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MECHANISMS OF CHANGE OF BACKGROUND RHYTHMICS OF LARGE HEMISPHERES

L. A. Novikova *In its* Basic Questions of the Electrophysiology of the Central Nervous System 21 Feb. 1966 p 210–240 refs (See N66-32686 19-04) CFSTI: HC $6.00/MF $1.25

The role of specific and nonspecific afferent systems in the electrogenesis of cortical rhythmics was deduced from a brief literature review on electrophysical observations as expressed in the form of synchronized rhythms. These rhythmics were the propagation reactions of ganglionic formations to external influences; best delineated synchronized rhythms were obtained from the hippocampus, hypothalamus, and recticular formations. A series of electrophysical data from blind and deaf-mute persons, and from rabbit cortexes after bilateral enucleation or after visual deafferentation established that the reticular brain formation was important to fast and widely generalized changes of cortical rhythmics. Prolonged, stationary changes of the electrical cortex activity were to a large measure determined by impulsations proceeding along sensory paths and especially, to the visual analyzer. G.G.

N66-32697*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ON THE DYNAMICS OF CAPILLARIES AND THE EXISTENCE OF PLASMA FLOW IN THE PERICAPILLARY LYMPH SPACE

John T. Howe and Yvonne S. Sheaffer Washington, NASA, Aug. 1966 46 p refs Presented at the Intern. Symp. on the Human Capillary Circulation, Jamaica, West Indies, 1966
(NASA-TN-D-3497) CFSTI: HC $2.00/MF $0.50 CSCL 06P

The present paper describes the results of an analysis of a double-walled capillary model from the hydrodynamic point of view. The hydrodynamic analysis shows that even without the annulus, one can account for organ hematocrits as low as 50 percent of the large blood vessel hematocrits. But the corresponding pressure gradients fall outside the range of those cited in the literature. Moreover, without the plasma annulus one cannot readily account for those hematocrit ratios below 0.5 (actually as low as 0.35) that have been observed experimentally. However, the analysis shows that with the annulus of plasma, hematocrit ratios as low as 0.27 can be explained, and the corresponding pressure gradients fall within the range cited in the literature. Although the annulus of plasma was proposed to explain the surplus of plasma in some organs, it allows a deficit of plasma under some circumstances. The explanation lies in the dynamics. The analysis shows that for this condition the endothelium radius is only slightly larger than that of the red cells. Thus the pressure gradient can drive plasma against the low resistance of the annulus at a greater rate than it can drive cells along inside the endothelium because of the snug fit. Author

N66-32796# Joint Publications Research Service, Washington, D. C.
RECENT STUDIES IN SOVIET PHYSIOLOGY
23 Jun. 1966 46 p refs Transl. into ENGLISH from Fiziol. Zh., Akad Nauk Ukr. RSR (Kiev), v. 12, no. 2, Mar.–Apr. 1966 p 138–154, 269–276
(JPRS-36165; TT-66-32599) CFSTI: $2.00

CONTENTS:

1. THE SIGNIFICANCE OF THE ADAPTATION TO HYPOXIA FOR THE PREVENTION OF AGING M. M. Syrotynin p 1–13 refs (See N66-32797 19-04)

2. DIRECTED APPLICATION OF BIOLOGICALLY ACTIVE SUBSTANCES AS A MEANS OF ACTIVE PREVENTION OF PREMATURE AGING. INCREASING VITALITY DURING PHYSIOLOGICAL AGING Yu. O. Spasokukots'kyy p 14–23 refs

3. REFLEXOGRAPH—A DEVICE FOR THE STUDY OF HUMAN HIGHER NERVOUS ACTIVITY K. O. Shkabara Ye. A. Rushkevych, V. V. Kornyeyev, and O. Ya. Mazurenko p 24–30

4. GLASS MICROELECTRODES WITH METAL CONDUCTORS FOR EXTRACELLULAR RECORDING OF POTENTIALS L. V. Reshod'ko and O. P. Vetrov p 31–35 refs (See N66-32798 19-04)

5. METHOD OF STATISTICAL ANALYSIS OF A VECTORCARDIOGRAM V. H. Povlov p 36–39 refs

N66-32797# Joint Publications Research Service, Washington, D. C.
THE SIGNIFICANCE OF THE ADAPTATION TO HYPOXIA FOR THE PREVENTION OF AGING
M. M. Syrotynin *In its* Recent Studies in Soviet Physiol. 23 Jun. 1966 p 1–13 refs (See N66-32796 19-04) CFSTI: $2.00

General information, personal observations, and statistical data concerning the longevity of people living in different regions and at various altitudes are at first given. This is followed by a discussion of hypoxia and its effects on various organs and on aging. Several examples are presented of the effects of hypoxia on physiological and neurological functions and on human reaction. It is pointed out that adaptation to hypoxia may retard premature aging. Case studies and facilities for such adaptation training in the U.S.S.R. are mentioned.
K.W.

N66-32798# Joint Publications Research Service, Washington, D. C.
GLASS MICROELECTRODES WITH METAL CONDUCTORS FOR EXTRACELLULAR RECORDING OF POTENTIALS
L. V. Reshod'ko and O. P. Vetrov *In its* Recent Studies in Soviet Physiol. 23 Jun. 1966 p 31–35 refs (See N66-32796 19-04) CFSTI: $2.00

The method of plating the glass microelectrodes, and an evaluation of the magnitude of electrode potential relative to the Ringer solution, the duration of the constant potential during chlorination and in absence of it, and the dependence of active resistance on thickness of the silver layer are given. Composition and preparation of the nitric acid of silver solution and the reducing agent solution are explained. The manner of fastening the electrodes for insertion into the solution is described, and the importance of the proper solution temperatures is pointed out. Resistance, current, and potential values of the electrodes are presented in tables and were compared with a normal calomel electrode filled with Ringer solution. The electrodes were used for irritation and diversion of acting current from Ranvier interceptors of single myelinized tissues of a frog. K.W.

N66-32800*# Ling-Temco-Vought, Inc., Dallas, Tex. Astronautics Div.
REMOTE MAN-MACHINE CONTROL SYSTEM EVALUATION Final Report
A. G. Charron Aug. 1964 230 p refs *Its* Rept.-00.424
(Contract NASw-744)
(NASA-CR-76889) CFSTI: HC $3.75/MF $1.25 CSCL 05H

Remote control systems for space exploration and the various configurations of such systems are given. An operations analysis on a representative mission was performed, and a system requirements methodology was developed. Studied was the detailed reconnaissance of the Martian surface and its environment. The general environmental parameters were determined and related to the information requirements to fix the location of sensors for data acquisition. Automatic and remotely controlled system approaches were compared with respect to reliability, weight, and cost. The location of man and his role in the loop was compared, with man being considered in the role of an information manager, and a man/machine loop analysis summary format was developed as a means of defining system requirements. The mission description is for a typical remotely controlled system in a representative manned capture orbit profile. Studies of eccentric, circular, and synchronous Martian orbits and multiple surface sites were made and the implications of the various orbits compared. Examples for the tasks of observation and locomotion are presented in tables. K.W.

N66-32925*# Westinghouse Electric Corp., Pittsburgh, Pa. Bioengineering and Biosciences Technology Dept.
NASA CONTRIBUTIONS TO: CARDIOVASCULAR MONITORING
William J. Jones and Wyatt C. Simpson Washington, NASA, 1966 48 p refs Sponsored by NASA
(NASA-SP-5041) CFSTI: HC $2.00/MF $0.50 CSCL 06B

A survey is presented of physiological monitoring techniques as they apply to an intact human subject. Primary emphasis is placed upon the methodology involved in making physiological measurements and the sensing systems used. Major areas covered include techniques of cardiovascular monitoring, NASA technological advances, and the medical market. These major areas include discussions of blood pressure measurement by occlusion, blood pressure monitoring, non-occlusive indirect measuring methods, pulse rate, cardiac

activity, blood flow rate measurements, oxygen saturation of blood, direct force balance probes, and vibrocardiography. C.T.C.

N66-32959*# Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
CHARACTERIZATION OF TIME-VARYING HUMAN OPERATOR DYNAMICS
G. A. Gagne and W. W. Wierwille Washington, NASA, Aug. 1966 87 p refs
(Contract NAS1-4920; Proj. ICARUS)
(NASA-CR-539) CFSTI: HC $3.00/MF $0.75 CSCL 05H

Linear time-varying, nonlinear time-varying, and nonlinear constant coefficient models of the human operator in tracking tasks were determined. The experiments were to characterize the human operator. The deterministic time varying characterization theory was used, and a set of rules by which each operator responds to the displayed signals was devised. The determination of the causes of the time-variations in the transfer characteristics was emphasized. Three experienced pilot–engineers and one non-pilot engineer were the subjects. Linear time-varying models were obtained for tracking tasks with various one- and two-axis displays with corresponding one- and two-axis dynamics. Follow-up dynamics were the same for all experiments and were identical for both axes. They were chosen so as to be similar to the pitch and roll dynamics of a jet fighter aircraft. An attempt was made to develop a "logic model" of the operators, which was to simulate their logic strategy while tracking in a control system. Instrument arrangements and data processing methods are included. The studies indicate that logic models with accuracies of 15% to 20% N.I.S.E. are theoretically possible. K.W.

N66-32963*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.
AN ASSEMBLY CONTAMINATION MODEL
E. J. Sherry and C. A. Trauth, Jr. Jul. 1966 36 p refs
(NASA Order R-09-019-040)
(NASA-CR-76999; SC-RR-66-421) CFSTI: HC $2.00/MF $0.50 CSCL 06T

A model of biological contamination of a structure during assembly is developed. This model is stochastic in nature, treating both the amount of contamination and its surface distribution on the structure as random variables. It is hoped that by using this model and subsequent refinements of it, one may be able to specify conditions under which the level of biological contamination of a structure may be predicted statistically with any desired degree of confidence. Author

N66-33042# Flying Personnel Research Committee, London (England).
VENTILATION UNDER A COMBINED PARTIAL PRESSURE ASSEMBLY: A COMPARISON OF TWO AIR VENTILATED SUITS IN MAINTAINING THERMAL BALANCE BY EVAPORATION OF SWEAT
J. M. Clifford and R. H. Farrow Oct. 1965 14 p refs
(FPRC/MEMO-221) CFSTI: HC $1.00/MF $0.50

The air ventilated suit Mk 2 was shown on two counts, the final pulse rate and final oral temperature, to be a better air ventilated suit than the Mk 3 under the experimental conditions. It is also suggestive that the insulation provided by the ventile immersion suit is beneficial when the AVS is receiving the specified air ventilated suit air supplies under these experimental conditions. Author

N66-33044# Flying Personnel Research Committee, London (England).
THE USE OF THE PRESSURE ECONOMISER OXYGEN SYSTEM IN HIGH PERFORMANCE AIRCRAFT IN WHICH CREW MEMBERS ARE ROUTINELY EXPOSED TO POSITIVE ACCELERATIONS
J. Ernsting\Sep. 1964 15 p refs
(FPRC/MEMO-215) CFSTI: HC $1.00/MF $0.50

The prevention of the lung collapse which is induced by exposure to positive acceleration whilst breathing 100% oxygen is discussed. It is concluded that the inspired gas should contain at least 50% nitrogen in order to reduce the incidence of lung collapse in flight to an acceptable level. The concentration of nitrogen provided by pressure economiser breathing systems has been considered in relation to pulmonary ventilation and altitude. It is concluded that, at its best, the pressure economiser system which is acceptable for use in high performance aircraft will provide much less than 50% nitrogen in the inspired gas during quiet breathing at altitudes greater than 10,000 ft. In view of the evidence at present available, it is recommended that pressure economiser systems are unacceptable for use in all aircraft where the crew may be routinely exposed to positive accelerations. Author

N66-33109# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
INVESTIGATIONS OF THE ACCURACY ATTAINED IN ROUTINE FILM BADGE DOSIMETRY
W. A. Langmead and N. Adams Mar. 1966 31 p refs Presented at the 10th Ann. Meeting of the Health Phys. Soc., Los Angeles, 14–17 Jun. 1965
(AHSB(RP)-R-62)

The experiments have been performed to provide data on the accuracy attained in the routine assessment of radiation doses to personnel by means of film badges. In the first experiment, performed at the end of 1961, measurements were made by means of a pressed tin-plate badge of relatively simple design which was in general use at that time for radiation monitoring by the staff of the U.K. Atomic Energy Authority. In the second experiment, the more recently introduced AERE/RPS multifilter plastics film holder was used in the measurements. In both experiments each participating establishments for dose assessment. The results of the dose assessments obtained in the two experiments have been compared. It is shown that the AERE/RPS multi-filter film holder enables improved accuracy to be attained; the most significant improvements arise from the elimination of the over-estimates of dose obtained for some X- and gamma-ray mixtures with the earlier dosimeter as a consequence of its inability to identify a soft-radiation component as X-rays or beta-rays. Author

N66-33115# Flying Personnel Research Committee, London (England).
PILOTS' RESPIRATION DURING A STANDARD TRAINING FLIGHT PROFILE
P. Norris (RAF, Farnborough) Sep. 1964 54 p refs
(FPRC/1230) CFSTI: HC $3.00/MF $0.50

Experiments were carried out to determine respiratory minute volumes and respiratory rates, on a series of Canberra pilots flying as near as possible the same flight profile. This included: take-off and climb to height, normal cruise conditions, instrument approaches, and asymmetric flying. An anemometer was inserted into the pilot's oxygen line in a Canberra B6 aircraft. A digital counter was connected electrically to the doll's eye blinker mechanism operated by the demand valve of the pilot's oxygen regulator. By taking readings of these two instruments every minute, it was possible to record respiratory minute volume and respiratory rate from take-off to touchdown. Author

N66-33117# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.

A REVIEW OF THE TOXICOLOGY AND POTENTIAL HAZARDS OF NATURAL, DEPLETED AND ENRICHED URANIUM

E. J. Bennellick Mar. 1966 44 p refs

(AHSB(RP)-R-58) HMSO: 6s

This report is based on a selection of published and unpublished data on uranium, its compounds, and alloys. It reviews from the standpoint of potential hazards, the main physical, chemical and nuclear properties and biological behavior of uranium. The report discusses the toxicology of uranium and also reproduces the derived working limits for exposure to the material. Data is given on external radiation dose rates including that from processed irradiated uranium. Finally a review is given of fire and explosion hazards and criticality aspects. Author

N66-33138# Royal Swedish Academy of Sciences, Stockholm.

VIBRATIONS OF TRACTOR DRIVER

Sigfrid Bjerninger 1966 127 p refs *Its* Acta Polytechnica Scandinavica Mech. Eng. Ser. No. 23

CFSTI: HC $4.00/MF $1.00

The vibrations to which the tractor driver is exposed were field tested using different tractorseat designs, suspension and damping characteristics, tractors, ground and road conditions, and varying speeds. Laboratory experiments included testing the spring characteristics and the suspension dynamics of different seats, and also the possibilities of decreasing the vibration strains on the driver by choosing suitable seat suspension and damping. Seat design in other respects and the positioning of the seat were also studied. The results from theoretical investigations were compared with those from the laboratory experiments and field tests. It was evident that the suitability of the seat with regard to suspension and damping characteristics can be determined quite satisfactorily by determining the static spring characteristics and by drop tests. The correct combination of tractor and seat with driver can be tested by placing the tractor on a vibration machine with only the rear wheels on the uneven rollers. The investigation indicated the technical possibilities of decreasing the vibration strains to which tractor drivers are exposed, and principles for the design and choice of tractor seats were established. Author

N66-33173*# Brandeis Univ., Waltham, Mass. Graduate Dept. of Biochemistry.

STRUCTURAL AND FUNCTIONAL PROPERTIES OF THE H AND M SUBUNITS OF LACTIC DEHYDROGENASES

Thomas P. Fondy and Nathan O. Kaplan [1964] 31 p refs Submitted for Publication

(Grants NsG-375; NIH-CA-03611; Am. Cancer Soc. 6-P-776) (NASA-CR-59942) CFSTI: HC $2.00/MF $0.50 CSCL 06A

On the basis of structural characteristics, the lactic dehydrogenases (LDH's) may be divided into two basic types, the H type and the M type. The structural distinctions between these two basic types extend to their amino acid compositions, to their primary sequences as measured by comparative fingerprint patterns and immunological cross reactions, and to their temperature stabilities. In spite of the marked differences between the two types of LDH subunits, important structural similarities are retained. The H and M subunits are similar in molecular weight and shape. They possess the identical active site sulfhydryl peptide, and they can associate with LDH subunits from a wide variety of species into the hybrid forms of active LDH. The H and M subunits of LDH show distinctive catalytic properties. The M types are adapted to function at higher substrate concentrations than are the H types. The synthesis of M subunits is stimulated by low oxygen tension, whereas the synthesis of H subunits is not affected in this manner. The M type of LDH predominates in tissues that operate by a relatively anaerobic metabolism. Author

N66-33198*# General Dynamics/Convair, San Diego, Calif.

FEASIBILITY STUDY OF FREEZE-OUT TECHNIQUES FOR CONTAMINANT CONTROL WITHIN MANNED SPACECRAFT ATMOSPHERES Final Technical Report, 11 Oct. 1965–11 Apr. 1966

G. L. Drake, E. J. Russ, J. C. Ballinger, W. J. Sevier, and D. W. Vorbeck 27 May 1966 151 p refs *Its* Rept.-64-26243

(Contract NAS1-5625)

(NASA-CR-66150) CFSTI: HC $5.00/MF $1.00 CSCL 05E

An analytical and experimental program in three phases was carried out for the purpose of assessing the feasibility of a freeze-out technique for control of trace contaminants in atmospheres of manned spacecraft. The Phase I task area was to perform analysis which defined performance and limitations of the techniques, based on the MORL vehicle in the primary and several alternate missions The Phase II experimental effort included design, fabrication, and operation of a laboratory breadboard freez-out apparatus to determine freeze-out performance with a selected group of potential contaminants. The Phase III task area was to evaluate feasibility of the method, based on results of Phases I and II, and to establish follow-on objectives. Author

N66-33199*# National Aeronautics and Space Administration, Washington, D. C.

MEDICAL ASPECTS OF AN ORBITING RESEARCH LABORATORY. SPACE MEDICINE ADVISORY GROUP STUDY, JANUARY TO AUGUST, 1964

Sherman P. Vinograd 1966 152 p refs

(NASA-SP-86) GPO: HC $1.00; CFSTI: MF $1.00 CSCL 06S

Human reaction to aerospace medical experiments for an orbital research laboratory (ORL) is reported, and recommendations are presented for ground and life support systems. Spacecraft design, and ground-based as well as in-flight experiments, are recommended for six categories covered: hazards, atmosphere, living conditions, metabolic factors, group integrity, and medical considerations. Consideration is given to toxicological and general housekeeping problems in the spacecraft, body functions and hygiene, and illumination and work schedules; food, water, and waste requirements for metabolism; noise factors in harmonious group functioning; flight crew medical selection, and illness and injury safety monitoring; physiological system testing, including neurologic functions, and metabolic functions as related to hematology; psychological experiments on emotions, performance, reaction to frustration, and spontaneous activities. Data are included on specific spacecraft design, personnel requirements, and bioinstrumentation and laboratory facilities on the spacecraft. R.LI.

N66-33200# Joint Publications Research Service, Washington, D. C.

USSR STUDIES ON HUMAN ACCLIMATIZATION AND OPHTHALMOLOGY

28 Jun. 1966 18 p Transl. into ENGLISH from Zdorov'ye (Moscow), no. 4, 1966 p 3–5

(JPRS-36229; TT-66-32662) CFSTI: $1.00

CONTENTS:

N66-33201# Joint Publications Research Service, Washington, D. C.

BIO-MEDICAL PREPARATIONS FOR A MANNED LANDING ON THE MOON

In its USSR Studies on Human Acclimatization and Ophthalmol. 28 Jun. 1966 p 1-3 (See N66-33200 19-04) CFSTI: $1.00

Briefly discussed are biomedical developments of life support systems and protective, pressurized suits for use in a manned, soft landing on the moon. The significance of the Luna-9 soft landing with automatic instrumentation is reviewed in the light of future possibilities for safe impact landings to obtain data on the lunar surface, mineral resources, and cosmic, ultraviolet, and infrared radiation of lunar space. R.LI.

N66-33202# Joint Publications Research Service, Washington, D. C.

ACCLIMATIZATION TO THE FAR NORTH

G. M. Danishevskiy *In its* USSR Studies on Human Acclimatization and Ophthalmol. 28 Jun. 1966 p 4-8 (See N66-33200 19-04) CFSTI: $1.00

Briefly outlined are special scientific centers' programs for studying the polar regions, and man's acclimatization and physiological response to extreme climatic conditions. The role played by hormones, enzymes, and vitamins in the adjustment of the human organism to changes in barometric pressure, temperature, humidity, and light intensity is mentioned. The use of body lubrication with fish fat is reported as protection against frostbite among new settlers to arctic regions, and the following procedures to acclimatize the human organism are listed: prior physical examination, establishment of a work routine, temperature regulation in living quarters, balanced nutrition, moderation in use of alcoholic beverages, avoidance of tapeworm, use of vitamin salt addition to drinking water, and participation in sports. R.LI.

N66-33247# California Univ., San Francisco. Dept. of Neurology.

CENTRAL NERVOUS SYSTEM RESPONSE TO LOW-LEVEL X-IRRADIATION

Crawford F. Sams Dec. 1965 148 p refs

(Contract OCD-OS-62-148)

(AD-633620) CFSTI: HC $4.00/MF $1.00

An electrophysiological response of the central nervous system of dogs manifested by high-voltage, erratic spiking and bilateral asynchrony was shown to exist following low-level head-only X-irradiation of 1-100 rad. Evidence obtained in a study of possible mechanisms involved is consistent with nerve cell membrane permeability changes. Author (TAB)

N66-33248# Mitre Corp., Bedford, Mass.

STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART IX: THE EFFECTS OF RESOLUTION, SIZE, AND VIEWING ANGLE OF LEGIBILITY

Donald Shurtleff, Marion Marsetta, and Diana Showman May 1966 47 p refs

(Contract AF 19(628)-5165)

(MTR-5; ESD-TR-65-411; AD-633833) CFSTI: HC $2.00/MF $0.50

An investigation was made to determine the visual sizes required for the identification of standard and revised Leroy alphanumerics, which were televised at resolutions of 10, 8 and 6 lines per symbol height. The visual size needed for 99% identification accuracy was similar for resolutions of 10 and 8 lines, but a significantly larger visual size was required for symbols resolved by 6 lines. There were no significant differences in visual sizes required for identification of standard versus revised Leroy symbols at any value of resolution. The findings were used to calculate the effective area for viewing televised symbols. Author (TAB)

N66-33257# Göteborg Univ. (Sweden) Inst. of Neurobiology.

BIOCHEMISTRY OF CNS CELLS DURING LEARNING Final Scientific Report, 1 Apr. 1965-31 Mar. 1966

H. Hyden 25 Apr. 1966 46 p refs

(Grant AF-EOAR-65-53)

(AFOSR-66-0932; AD-633982) CFSTI: HC $2.00/MF $0.50

Synthesis of rapidly labelled RNA in brain cells was studied by sucrose density gradients. After a 15 minute pulse of 3H-orotic acid in the nuclear fraction and after 30 minutes in the cytoplasmic fraction, heterogeneous RNA was found in the range of 8-12 S. After further 15 to 30 minutes the profile of the synthesized RNA was changed due to a shift of the RNA peaks to 16-30 S. The synthesis of RNA was twice as rapid in the glia as in the nerve cells. The RNA synthesized in a learning situation in neurons and glia involved in the activity leading to the behavioral change was characterized in one case by a DNA-like composition and in another case by asymmetry, high adenine values and low (G+C)/(A+U) values compared to those of ribosomal RNA. To judge by these parameters, the lost RNA synthesized in cortical and brain stem neurons and glia in learning is of a chromosomal type. A case of biochemical error involving the RNA of the glia (Parkinson's disease) is discussed. The characteristics of the lost RNA produced in the glia at an early stage of the disease are taken to reflect a release of undesirable genomic activities at a crucial period of the life cycle. TAB

N66-33259# Systems Development Corp., Santa Monica, Calif.

AN EMPIRICAL COMPARISON OF ON-LINE AND OFF-LINE DEBUGGING

E. E. Grant 18 May 1966 19 p refs

(Contract AF 19(628)-5166; ARPA Order-773)

(SP-2441; AD-633907) CFSTI: HC $1.00/MF $0.50

The experiment compared the program debugging (checkout) performance of programmers using a time-sharing system (TSS) with the debugging performance of programmers using a simulated closed shop. Twelve programmers participated in the study. Each programmer was given two problem statements and was asked to write a program to solve each. One problem required a program to interpret and solve algebraic equations, the other problem required a program to find the single path through a 20×20 cell maze represented in the computer by a 400-entry table. Six solutions (programs) to each problem were debugged on line using TSS and six were debugged off line using a simulated closed-shop system with a desk-to-desk turnaround time of two hours. Performance was measured in terms of man hours to debug and central processor time used in debugging. Programmers who debugged their algebraic interpretation programs on line used slightly fewer man hours and about three times as much central processor time as did programmers who debugged these programs off line. Programmers who debugged their maze programs on line used about one-third as many man hours and slightly more central processor time than those who debugged their maze programs off line. TAB

N66-33260# Kentucky Univ., Lexington. Dept. of Physiology and Biophysics.

CALORIGENIC RESPONSE OF WARM-ADAPTED AND COLD-ADAPTED RABBITS TO INTRAVENOUS INFUSION OF EPINEPHRINE AND NOREPINEPHRINE Technical Report, Sep. 1962-Sep. 1963

William V. Judy Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Mar. 1966 34 p refs

(Contract AF 41(657)-380)

(AAL-TR-63-15; AD-633345) CFSTI: HC $2.00/MF $0.50

Measurements were made on 16 New Zealand and 8 Dutch breed rabbits to determine the effect of cold acclimation of the calorigenic responsiveness to epinephrine and norepinephrine. Oxygen consumption, colonic temperature, respiratory rate and blood glucose measurements were made before, during and after intravenous infusion of epinephrine (3 μg/kg/min) and norepinephrine (30 μg/kg/min). Warm-adapted rabbits (27° ±1°C) showed less increase in colonic temperature and oxygen consumption after infusion of epinephrine and norepinephrine than did cold-adapted rabbits (5° ±1°C). Blood glucose concentration increased equally in both groups after infusion of epinephrine and norepinephrine and increased after infusion was stopped. In cold-adapted groups I and III norepinephrine infusion increased oxygen consumption 3 and 13 times greater than that of warm-adapted groups I and III. In cold-adapted group II oxygen consumption did not increase notably above that of warm-adapted group II after infusion of norepinephrine. Epinephrine infusion induced an increased oxygen consumption in cold-adapted groups I and II two and five times greater than that of warm-adapted groups I and II. Cold-adapted group III showed no marked increase in oxygen consumption above that of warm-adapted group III after infusion of epinephrine. Author (TAB)

N66-33265# Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART IV: THE EFFECTS OF BRIGHTNESS, LETTER SPACING, SYMBOL BACKGROUND RELATION AND SURROUND BRIGHTNESS ON THE LEGIBILITY OF CAPITAL LETTERS
Donald Shurtleff, Beverly Botha, and Marion Young May 1966 25 p refs
(Contract AF 19(628)-5165)
(W-06899; ESD-TR-65-134; AD-633853) CFSTI: HC $1.00/MF $0.50

Two exploratory studies are reported in which the effects of brightness, letter spacing, symbol background relation, and surround brightness on legibility were determined. As a measure of legibility, both studies used the reciprocal of the visual angle subtended at the eye by capital letters when the subject identified correctly 50 percent of the letters in a matrix. A matrix consisted of 20 letters arranged in 4 rows and 5 columns. The first study showed that legibility was significantly altered by brightness, spacing, and symbol background relations. The complexity of the effects of each of these factors was shown by the significant interactions among them. The second study showed surround brightness for the light letters on a dark background to be significant factor in legibility.
Author

N66-33266# Naval Air Development Center, Johnsville, Pa.
DISTRIBUTION OF PULMONARY BLOOD FLOW AS AFFECTED BY TRANSVERSE (+ G_x) ACCELERATION Final Report
Frederic G. Hoppin, Jr., Elihu York, David E. Kuhl, and Richard W. Hyde 31 Dec. 1965 32 p refs
(Contract AT(30-1)-3175; Grant PHS C-4456)
(NADC-MR-6517; AD-633473) CFSTI: HC $2.00/MF $0.50

The distribution of blood flow in the pulmonary vascular bed under $+G_x$ (forward or transverse acceleration) was studied by the intravenous injection of radioactive ^{131}iodinated-macro aggregated albumin (^{131}I-MAA) in three normal subjects while they were under $+1G_x$, $+4G_x$, and $+8G_x$ on a human centrifuge. The resulting distribution of radioactivity in the lungs, representing the distribution of pulmonary blood flow at the time of injection, was assessed one to three hours later by lateral radioisotope scanning. The distribution of pulmonary blood flow was not markedly different at $+1G_x$, $+4G_x$, and $+8G_x$ despite a hydrostatic gradient in pulmonary intravascular pressures estimated to be 88 mm hg under $+8G_x$. These findings indicate that under $+G_x$ (forward or transverse acceleration) unlike $+G_z$ (headward or positive acceleration) the distribution of pulmonary blood flow is not markedly distorted, and that the regional flow of blood in the lung may not be significantly changed by high intravascular pressures.
Author (TAB)

N66-33353# Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART VI: LEROY AND COURTNEY SYMBOLS
Donald Shurtleff and D. Owen May 1966 39 p refs
(Contract AF 19(628)-5165)
(ESD-TR-65-136; TM-4212; AD-633855) CFSTI: HC $2.00/MF $0.50

At vertical resolutions of 12-, 10-, 8-, and 6-scan lines per symbol height, the legibility of Courtney alphanumeric symbols, designed especially for television, was compared with that of standard Leroy symbols. These symbols were presented singly on a 525-line TV monitor, and the speed and accuracy with which they were identified by groups of subjects having normal vision were recorded. A group of subjects viewed only the Courtney symbols, while another viewed only the Leroy. The results showed that, at any resolution value, identification of Courtney symbols was no better than for Leroy. Some practice was required with the Courtney symbols before it was possible to obtain a performance equal to that of the Leroy. This study supports the findings of other experiments: that a resolution of 10 lines per symbol height remains the lowest value recommended for TV displays. Author (TAB)

N66-33374*# Detroit Univ., Mich. Inst. of Space Biophysics.
PORPHINE-LIKE SUBSTANCES. III: SYNTHESIS BY ELECTRICAL DISCHARGE
Anton Szutka and Ronald H. Radzilowski [1964] 8 p refs Presented at the Natl. ACS Meeting, Detroit, 4–9 Apr. 1964
(Grant NsG-226-62)
(NASA-CR-60078) CFSTI: HC $1.00/MF $0.50 CSCL 06A

Electrical discharge between an electrode connected to a Tesla coil and the surface of an aqueous suspension of a mixture of pyrrole and benzaldehyde produces porphine-like substances. Among others the compound α, β,γδ-tetraphenylporphine (TPP) has been identified by: (1) Separation of the compound by the thin layer chromatographic technique using silica gel and two percent xylene in benzene as adsorbent and developing mixture respectively. (2) Visible spectra of the zinc-chelate of the compound compared with the chelate of the reference TPP. The yields of the compound in the presence of molecular oxygen, are increased over the yields obtained in runs performed under primitive atmosphere i.e. methane, ammonia and molecular hydrogen. Storage of the irradiated mixture either in benzene or as aqueous suspension increases the total yield. These results imply that the formation of porphine-like substances is abiogenically possible under primitive earth conditions. Author

N66-33376*# California Univ., Berkeley. Space Sciences Lab.
PRESENT STATUS OF THE AMINO ACID CODE
Thomas H. Jukes [1964] 25 p refs Presented at the Ann. Meeting of the Am. Dietetic Assoc., Portland, Oreg., 29 Jul. 1964 Submitted for Publication
(Grant NsG-479)
(NASA-CR-59734) CFSTI: HC $1.00/MF $0.50 CSCL 06A

Protein composition studies established that the amino acid code, also termed the genetic code, is the key by which the sequence of DNA bases adenine (cytosine, guanine, and thymine) is translated into amino acids during synthesis. It is believed that the final step in protein synthesis is directed by the

ribonucleic acid (RNA) which is made up of nucleosides linked together by phosphates. Mutational changes can be induced by replacing one base with another, or by adding or deleting a base from the DNA. Unacceptable changes are quickly eliminated by the process of natural selection; at rare intervals a change takes place which improves the characteristics of its possessor and may lead to the development of new species. G.G.

N66-33382*# Brandeis Univ., Waltham, Mass. Graduate Dept. of Biochemistry.

EVOLUTION OF DEHYDROGENASES

Nathan O. Kaplan [1964] 74 p refs Submitted for Publication

(Grant NsG-375)

(NASA-CR-59967) CFSTI: HC $3.00/MF $0.75 CSCL 06A

Methods whereby the relationship among the same enzymes from different organisms can be compared are reviewed, and the significance of changes in enzyme structure during evolution is discussed with emphasis on DPN-linked dehydrogenases. Comparative biochemical studies on enzyme amino acid sequences, catalytic characterizations with coenzyme analogs and inhibitors, immunological fixation methods, and temperature stability and electrophoresis mobility criteria of animal DPN-liked specific lactic dehydrogenases (LDH's) established that the H type LDH's in closely related species usually have similar electrophoretic migration rates. Evolutionary changes in the mammalism M type LDH are indicated by their different sensitivities to high pyruvate concentrations; strongly anaerobic M type LDH's are found in active animals which produce a great deal of lactic acid in contrast to humans, who develop an enzyme sensitive to high concentrations of pyruvate. G.G.

N66-33387*# California Univ., Los Angeles.

SPECTRAL ANALYSIS TECHNIQUES AND PATTERN RECOGNITION METHODS FOR ELECTROENCEPHALOGRAPHIC DATA

W. R. Adey [1966] 42 p refs

(Grant NsG-502)

(NASA-CR-77039) CFSTI: HC $2.00/MF $0.50 CSCL 06B

Computing systems currently in use at the Brain Research Institute and computational methods and associated display techniques are discussed in terms of their application to electroencephalographic records for animals and man; and for the latter, in relation to baseline characteristics of a population of individuals in a gamut of states in sleep and wakefulness. Simple automated pattern recognition techniques applied to such records are described, as are computer applications to impedance measurements and cellular wave phenomena and the formulation of physiological models. Application of spectral analysis to a normative library of EEG data in states of sleep and wakefulness is described and illustrated, with establishment of baselines for adult males in the course of simple alerting vigilance task performance, and in visual discrimination of increasing difficulty. Possible future trends in electrophysiological data analysis are reviewed. M.W.R.

N66-33417*# California Univ., Los Angeles. Space Biology Lab.

RECORDING LEAF MOVEMENTS WITH A STRAIN GAUGE

T. Hoshizaki and K. Yokoyama (NASA. Ames Res. Center) [1964] 10 p Submitted for Publication

(Grants NsG-528; AF-AFOSR-246-63)

(NASA-CR-59801) CFSTI: HC $1.00/MF $0.50 CSCL 06C

A small lightweight leaf movement recording system using a strain gauge coupled to an amplifier and a recorder was fabricated, and a description of the sensing system is given. The unit was tested for temperature and voltage change effects, and errors were considered negligible. The small size of the sensing unit makes it possible to place several units on a single plant which would be placed in an orbiting capsule to study the effect of space environment on the circadian leaf movements. To test the reliability and accuracy of the system, the strain gauge unit was attached to a primary leaf of a Pinto bean, along with a kymograph attached to the same leaf. Recorded data from both sensors indicate that the maximum deviation of the strain gauge was not more than 5° from the values of the kymograph records. The gauge is now being used in experiments testing the effects of light dark cycles on the leaf movements of Pinto beans. L.S.

N66-33426# Computer Concepts, Inc., Los Angeles, Calif.

THE ROLE OF COMPUTERS IN HANDLING AEROSPACE SYSTEMS HUMAN FACTORS TASK DATA Final Report, 3 Jun. 1964–3 Jun. 1965

Irvin R. Whiteman Wright-Patterson AFB, Ohio. AMRL, Dec. 1965 183 p refs

(Contract AF 33(615)-1557)

(AMRL-TR-65-206; AD-631182) CFSTI: HC $5.00/MF $1.00

The characteristics of a computer based data system for handling human factors task information generated in support of advanced system development are described. On the basis of information gathered from users and generators of data at representative Government and contractor installations, the current and potential uses of computers were assessed to determine the desirable characteristics for a computerized human factors task data handling system. The proposed data handling system will assist the human factors specialist and system design engineers in the design and development of systems by providing them with means for: (1) drawing them closer to the data through a user-oriented system, (2) comparing data generated throughout the life-cycle of an advanced system and across systems, (3) analyzing data and conducting man-machine simulations, and (4) insuring that data are made available on a selective query and a timely basis. These objectives are met within the framework of a data system concept referred to as CENTRAL. The functions of CENTRAL are: (1) data storage and retrieval, (2) data processing, (3) computer program maintenance, and (4) system operational manual maintenance. Author (TAB)

N66-33444*# Hazleton Labs., Falls Church, Va.

LIFE DETECTION SUBSYSTEM Progress Report No. 1

Earl Usdin and George R. Perez Jul. 1966 55 p refs

(Contract NASr-10)

(NASA-CR-77032) CFSTI: HC $3.00/MF $0.50 CSCL 06P

Efforts during this period were concerned with the development of life detection systems based on phosphate uptake and sulfur uptake together with an examination of engineering problems associated with the instrumentation of these and related experiments. Conventional phosphate assays were studied as well as an assay which measures phosphate levels in terms of counts derived from ^{14}C-labelled triethylamine. Sensitivities down to 3 micrograms/l of phosphate-P were observed in the former case, while the latter has not yet been determined. As sensitivity in measuring phosphate uptake will require a low phosphate medium, attempts were made to adapt the previous media, M9 and M11, by decreasing phosphate levels. Cell cultures are being grown in more optimal media and then subcultured in the deficient media, after a conditioning period in phosphate-free media. When a high cell population is incubated in M9 or M11 with low phosphate, a dramatic decrease in the phosphate level of the extracellular solution is observed within a few hours, indicating phosphate uptake by the cells. Engineering efforts were concerned with liquid processing

systems designs, a study of the proposed single readout system, and a tentative study of photomultiplier tube selection.
R.N.A.

N66-33445*# Massachusetts Inst. of Tech., Cambridge.
RESEARCH IN PSYCHOBIOLOGY
H. L. Teuber, R. Held et al [1964] 9 p refs
(Grant NsG-496)
(NASA-CR-77064) CFSTI: HC $1.00/MF $0.50 CSCL 05J

This program is being conducted to develop an understanding of behavior and its neural correlates for assessing limits of human and animal capacities for space travel, and for monitoring and control of higher functions under extreme conditions. Efforts during this period continued to center around studies of brain-behavior relationships, of perception and learning, and in comparative and developmental psychology.
R.N.A.

N66-33446*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES, JUNE 1966
Jul. 1966 196 p refs
(NASA-SP-7011(26)) CFSTI: HC $1.00/MF $1.25 CSCL 06S

An annotated bibliography with indexes is presented to serve as a current abstracting and announcement medium for references on aerospace medicine and biology. Subject coverage includes biological, physiological, psychological, and environmental effects on man during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors are considered. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development are also recorded.
S.P.

N66-33461*# Systems Technology, Inc., Hawthorne, Calif.
PILOT DESCRIBING FUNCTION MEASUREMENTS IN A MULTILOOP TASK
R. L. Stapleford, D. T. Mc Ruer, and R. Magdaleno Washington, NASA, Aug. 1966 36 p refs
(Contract NAS2-1868-3)
(NASA-CR-542) CFSTI: HC $2.00/MF $0.50 CSCL 05H

Data essential for the development of detailed adjustment rules, loop closure criteria, and other aspects of model refinement are presented for multiloop systems. It is shown that the number of measurable pilot describing functions is equal to the number of uncorrelated inputs times the number of pilot outputs or controls. The aircraft control situation selected, consisting of a bank angle tracking task, is described. The following conclusions were drawn: (1) For multiloop control systems with an integrated display, the quasilinear pilot model and adjustment rules evolved for single loop systems are applicable to the multiloop system command loop. (2) The single loop pilot model is also applicable, with reservations, to inner loop closures. (3) When it is advantageous, a pilot can adopt a control crossfeed to reduce the inadvertent excitations of a subsidiary or nuisance mode. (4) Pilot performance in the command loop can be as good as that in a single loop task; however, his subjective opinion will be severely degraded. (5) When several feedback possibilities are present in a multiloop situation, the pilot will select those permitting the best dynamic performance with least pilot effort.
L.E.W.

N66-33484# Hofstra Coll., Hempstead, N. Y.
PRACTICE EFFECTS, KNOWLEDGE OF RESULTS AND TRANSFER IN PITCH DISCRIMINATION
Walter I. Heimer and Sherman J. Tatz (C. W. Post Coll.) Port Washington, N. Y., Naval Training Device Center, Apr. 1966 31 p refs
(Contract N61339-1337)
(NAVTRADEVCEN-IH-52; AD-634221) CFSTI: HC $2.00/MF $0.50

The effect of practice on the ability of Ss to discriminate differences in pitch between two sounds (difference thresholds or DLs) was investigated using four different experimental groups. These four groups differed in regard to the frequency at which training was given (800 or 3,000 cps), and whether or not knowledge of results was given. All discriminations were made against a white noise background. Training was given to all experimental Ss for four successive days with a fifth day devoted to both practice and a transfer test. The daily procedure consisted of listening to three tapes, each requiring 100 discriminations. A modified descending staircase procedure (method of limits) was utilized in obtaining the difference thresholds. The main findings were: (1) a negatively accelerated, declining curve of DLs for all four experimental groups with the largest drop taking place within the first day or two for most Ss, (2) discrimination was slightly better with knowledge of results than without, but not significantly so, and (3) the surprising fact that a net negative transfer of training effect was revealed when the transfer was attempted between the two different points on the frequency spectrum utilized here. Implications for auditory training procedures are discussed.
Author (TAB)

N66-33517# Saskatchewan Univ., Saskatoon.
PRECIPITIN RESPONSE TO HUMAN SERUM BY A RABBIT POPULATION. VARIATION IN RESPONSE OF NORMAL RABBITS TO A PRIMARY SERIES OF INJECTIONS, MAY 1961–JUNE 1964
W. G. Glenn and G. Bonar Sutherland Brooks AFB, Tex., School of Aerospace Med., Apr. 1966 12 p refs
(Contract AF 41(657)-384)
(SAM-TR-66-28; AD-634142) CFSTI: HC $1.00/MF $0.50

The report details the quantitative results of precipitin production in a rabbit population of 264 animals when each animal was given the same primary injection series with comparable human serum pools and the antiserums were reacted with the homologous antigen. This empirical study will help to anticipate the range of rabbit response in more limited investigations with complex antigens. The tolerance limit calculations are very large for precipitin production when random samples (groups of 10) from a population of rabbits are injected with complex antigen mixtures. The limits indicated that one can be 95% confident that at least 95% of the groups will have a mean total antigen-antibody precipitate nitrogen between 2,400 and 5,900 μg n/ml., if analyzed as herein described. These values pertain to the sum of all precipitinogen-precipitin reactions from antigen excess through antibody excess. This large variability makes it possible to unknowingly obtain groups of 10 animals whose response is different from that experienced in other similar studies.
Author (TAB)

N66-33519# School of Aerospace Medicine, Brooks AFB, Tex.
RESPONSES TO CORIOLIS STIMULATION IN FLYING PERSONNEL WITH DIFFERENT LEVELS OF PROFICIENCY, JUNE–NOVEMBER 1965
Edwin W. Moore Apr. 1966 12 p refs
(SAM-TR-66-36; AD-634406) CFSTI: HC $1.00/MF $0.50

The coriolis test, as part of physical evaluations, was administered to candidates for the Gemini program, candidates for the USAF research test pilot school, a representative cross section of Air Force pilots, and a group of nonflyers. The rates of decay of vertical nystagmic responses for the four groups were compared. A significantly different rate of decay was demonstrated between the groups. A greater amount of flying experience of the space pilot and test pilot groups resulted in a greater degree of habituation than shown by the representative cross section of Air Force pilots. All three groups of pilots demonstrated a significantly greater degree of habituation than the nonflyer group. The possible reasons for the significant differences found are discussed in terms of the stimuli presented and the habituation derived from flying experience.
Author (TAB)

N66-33542# Joint Publications Research Service, Washington, D. C.
ELECTRON MICROSCOPY OF BIOLOGICAL MACROMOLECULES
N. A. Kiselev 11 Aug. 1966 32 p Transl. into ENGLISH of Chapters I and VII from the book "Elektronnaya Mikroskopiya Biologicheskikh Makromolekul" Moscow, Nauka Publishing House, 1965 p 5–13, 126–138, 147
(JPRS-36944; TT-66-33374) CFSTI: $2.00

The role of structural information in molecular biology is discussed, as are the organization levels and symmetry of biological macromolecules and the use of electron microscopy in their study. Electron microscopy is specifically considered for the study of ribosomes, and a brief review is included of present-day concepts related to ribosomes. M.W.R.

N66-33543# Joint Publications Research Service, Washington, D. C.
BIOLOGICAL EFFECTS OF ULTRASOUND
S. I. Gorskhkov, O. N. Gorbunoy, and G. A. Antropov 10 Aug. 1966 55 p Transl. into ENGLISH of selections from the book "Biologicheskoye Deystviye Ul'trazvuka" Moscow, Meditsina Press, 1965 p 3–40, 154–186, 196–197
(JPRS-36924; TT-66-33354) CFSTI: $2.00

The effects of ultrasound on industrial workers and possible protective measures are discussed in selections from a book entitled *Biological Effect of Ultrasound*. Data indicate that the ear is not a critical organ in the perception of ultrasound, which can be transmitted through the entire surface of the body. Experiments with animals show that local action of ultrasound produces less pronounced biological effects than whole body exposure. In man, it is possible to have only so-called local effects to the face, neck, and hands, by the use of protective clothing on other parts of the body. A general discussion is included of ultrasound as a factor of human environment. M.W.R.

N66-33584# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
PAROTID FLUID URIC ACID RESPONSES TO PROBENECID ADMINISTRATION AND TO HEMODIALYSIS ON THE ARTIFICIAL KIDNEY Final Report, Sep. 1964–May 1965
Ira L. Shannon and Richard M. Freeman Apr. 1966 11 p refs
(SAM-TR-66-37; AD-634055) CFSTI: HC $1.00/MF $0.50

Two experiments were conducted to ascertain the relationship between serum and parotid fluid uric acid levels. Samples of blood and parotid fluid were collected from six healthy young adult males, both before and during a five-day period of uricosuric dosage. In the second experiment parotid fluid and blood samples were collected from two subjects undergoing hemodialysis on the artificial kidney. The experimental procedures brought about sharp decreases in serum uric acid for all subjects. A highly significant correlation was found between serum and parotid fluid levels in all instances. These results strengthen the premise that parotid fliud uric acid measurements possess diagnostic potential.
Author (TAB)

N66-33586# Virginia Univ., Charlottesville. Biochemical Lab.
ERYTHROCYTE BIOCHEMISTRY, 1 JULY 1965–30 JUNE 1966
Alfred Chanutin [1966] 72 p refs
(Grant DA-MD-49-193-65-G162)
(AD-633972) CFSTI: HC $3.00/MF $0.75

Erythrocyte enzymes; in vivo aging; glutathione; lipids; nucleotide metabolism; transport; erythrocyte preservation; glucose metabolism; components; anemias; effect of hormones; effect of hyperbaric oxygenation; osmotic fragility; effect of heavy metals; electrophoresis of erythrocytes; membrane structure. Author (TAB)

N66-33594# Educational Testing Service, Princeton, N. J.
COEFFICIENT ALPHA AND THE RELIABILITY OF COMPOSITE MEASUREMENTS Technical Report No. 1
Melvin R. Novick and Charles Lewis Apr. 1966 28 p refs
(Contract Nonr-4866(00))
(RB-66-18; AD-633840) CFSTI: HC $2.00/MF $0.50

Following a general approach due to Guttman, coefficient α is derived as lower bound on the reliability of a test. The necessary and sufficient condition under which equality is attained in this inequality and hence that α is equal to the reliability of the test is derived and shown to be closely related to the recent redefinition of the concept of parallel measurements due to Novick. This condition is then also shown to be closely related to the unit rank assumption originally adopted by Kuder and Richardson in the derivation of their formula 20. The assumption later adopted by Jackson and Ferguson and the one adopted by Gulliksen are shown to be related to the necessary and sufficient condition derived here. It is then pointed out that the statement that "coefficient α is equal to the mean of the split-half reliabilities" is true only under the condition assumed by Cronbach in the body of his derivation of this result. Finally some limitations on the uses of any function of α as a measure of internal consistency are noted.
Author (TAB)

N66-33612# George Washington Univ., Washington, D. C. Human Resources Research Office.
SUMMARY OF LITERATURE REVIEW ON EXTENDED OPERATIONS Consulting Report
Dennis Cannon, Eugene Drucker, and Theodore Kessler Dec. 1964 58 p refs
(Contract DA-44-188-ARO-2)
(AD-634037) CFSTI: HC $3.00/MF $0.75

The report comprises a summary of a review of psychological literature pertaining to performance for extended periods of time. The material is organized into the following topics, as they relate to performance: sleep loss, temperature, nutrition, prolonged performance, drugs, stress, vibration, confinement, rest and personnel replacements, noise radiation, and clothing. In addition, a brief summary of vigilance literature is included. The inconclusive nature of the reviewed research precludes supporting or denying the thesis that troops can be expected to remain effective for 48 hours or longer. Endurance limits may vary significantly from one task to another. For this reason, suggestions for research are included.
Author (TAB)

N66-33620# Technology, Inc., San Antonio, Tex.
RESEARCH FOR OCULAR EFFECTS OF THERMAL RADIATION Final Report, 15 Jun. 1964–15 Jun. 1965
Thomas A. Alexander, Roger L. Bessey, and Earl R. Lawler, Jr. Brooks AFB, Tex., School of Aerospace Med., Dec. 1965 55 p refs
(Contract AF 41(609)-2464)
(AD-634027) CFSTI: HC $3.00/MF $0.50

To study minimal retinal burns in test rabbits, Technology Incorporated designed and fabricated a solid-state circuit to pulse a xenon light source up to 5000 amperes for one millisecond. Procedures to irradiate the rabbits and to calibrate the light source are described. Data for 1.05-millimeter-diameter minimal retinal burns were obtained. For one rabbit, this data was plotted and a theoretical equation was fitted to the curve. This data and theoretical equation can now be used for the prediction of minimal retinal burns. Author (TAB)

N66-33630# Boston Univ., Mass. School of Medicine.
THE EFFECT OF DIPYRIDAMOLE ON THE ADENOSINE TRIPHOSPHATE LEVEL OF STORED HUMAN BLOOD Progress Report, Feb. 15–Sep. 30, 1965
John G. Gibson and Fabian Lionetti 8 Jun. 1966 29 p refs
(Contract Nonr-492(08))
(AD-634018) CFSTI: HC $2.00/MF $0.50

The addition of dipyridamole, a synthetic deaminase inhibitor at a concentration of .0001 M to human Heparin-ACD blood fortified with adenosine, resulted in an increase in ATP above control levels during storage at 4°C, rising to a maximum of 130% at five days and falling to 20% at 30 days. Aliquots of the same blood fortified with adenine, adenosine, or both incubated at 37°C for 30 hr showed levels at or slightly above the upper limit of +2 SD of normal. The addition of dipyridamole at a concentration of .0001M to similar aliquots showed significant increases in ATP above normal, rising to a maximum of 300, 350, and 400% in the aliquots fortified with adenine, adenosine, and both respectively, whereas the presence of adenine, adenosine, or both in Heparin-ACD blood did not significantly alter the rise in whole blood inorganic phosphate during incubation at 37°C for 30 hr, the addition of dipyridamole to similar aliquots depressed the level by from 20% to 30% of control values. Protection of the amino group of the adenine constituent of adenosine and AMP is a means to conserve erythrocyte ATP. Author (TAB)

N66-33637# Naval Radiological Defense Lab., San Francisco, Calif.
INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks Mar. 1966 22 p refs
(USNRDL-TR-998; AD-633606) CFSTI: HC $1.00/MF $0.50

The study describes the injury accumulation and recovery in sheep exposed to Co^{60} gamma rays (2/3 LD50/30) at dose rates of 0.5 to 3.9 R/hr. Immediately following the protracted exposure (165 R), no injury as defined by the lethality of a second exposure could be detected for those animals exposed to gamma radiation at dose rates of 0.5 and 0.95 R/hr. However, when animals were subjected to a similar total protracted exposure but at dose rates of 1.85 and 3.9 R/hr, significant amounts of injury could be detected immediately following the protracted exposure. Approximately 75 R (45%) and 104 R (63%) of the remaining injury was detected in animals exposed at dose rates of 1.95 and 3.9 R/hr, respectively. This suggests a threshold exposure rate, probably between 1.0 and 1.85 R/hr, for injury accumulation in sheep. Further experiments to relate the size of the conditioning exposure (protracted) to injury accumulation indicate that at an exposure rate of 3.6 R/hr., injury accumulation is a linear function of the total protracted dose. Author (TAB)

N66-33640# Research Analysis Corp., McLean, Va.
EVALUATION OF MULTIPLE-CRITERIA ALTERNATIVES USING ADDITIVE UTILITY MEASURES
Peter C. Fishburn Mar. 1966 35 p refs
(Contract DA-44-188-ARO-1)
(RAC-TP-200; AD-633595) CFSTI: HC $2.00/MF $0.50

This paper explains two theories behind additive methods of using human value judgments in the evaluation of multifactor alternatives and describes how these methods may be used. The alternatives to be evaluated in such situations may be, for example, people, performances, plans, policies, products, or systems. The two additivity theories presented come from utility theory, which is concerned with people's preferences. One of these theories is nonprobabilistic; the other uses probabilities. Among the methods discussed for obtaining an evaluator's utility functions for the criteria in a multifactor or multiple-criteria situation are a number of indifference-judgment methods, a method that uses probabilities (the gambles method), and a class of direct numerical-assignment methods. Author (TAB)

N66-33641# Air Force Systems Command, Wright-Patterson AFB, Ohio. Systems Engineering Group.
EVALUATION OF IMPROVED EXHALATION VALVE FOR HGU-8/P FLYING HELMET Final Report, Aug. 1963–Dec. 1965
Donald R. Good Apr. 1966 33 p
(SEG-TR-66-7; AD-633952) CFSTI: HC $2.00/MF $0.50

This report records the results of a component improvement program on an exhalation valve for the HGU-8/P partial pressure suit helmet. The program was intended primarily to eliminate the tendency for sudden pressure loss within the helmet caused by improper and erratic closing characteristics of the exhalation valve and to meet additional design objectives of greater opening sensitivity, lower pressure drops during flow conditions, and an overall increase in reliability. The valve and its function are described. Internal friction of moving parts was reduced. The opening or cracking pressure was reduced and the differential pressure under flow conditions was improved significantly. Test procedures and results obtained during low temperature tests and room temperature tests at high altitude are presented. It is concluded that the improved design meets the initial objectives of the program.
Author (TAB)

N66-33662# School of Aerospace Medicine, Brooks AFB, Tex.
AN EMERGENCY DENTAL KIT ENCASEMENT FOR USE ON EXTRATERRESTRIAL MISSIONS Progress Report, 24–27 Jan. 1966
Jack H. Ferguson and Jack L. Hartley Apr. 1966 13 p
(SAM-TR-66-34; AD-634466) CFSTI: HC $1.00/MF $0.50

Steps were taken to construct an emergency dental kit for buddy or self-care during prolonged space flight. Initial steps taken included a material study, material selection, a design study, prototype design, and destructive testing of a model. Also included is an explanation of the properties of Lexan and Nopcofoam, the materials selected, as well as of the other materials considered. A design based on sandwich construction was developed and the characteristics of this design are summarized. Author (TAB)

N66-33684*# National Aeronautics and Space Administration, Washington, D. C.

SEPARATION OF SIMPLE SUGARS ON CELLULOSE LAYERS [TRENNUNG EINFACHER ZUCKER AUF CELLULOSE-SCHICHTEN]

A. Schweiger Aug. 1966 10 p refs Transl. into ENGLISH from J. Chromatology, v. 9, 1962 p 374–376

(NASA-TT-F-10258) CFSTI: HC $1.00/MF $0.50 CSCL 06A

Polysaccharide hydrolysates were investigated with respect to their content in sugar and uronic acids. The following motion substances were used: acetic acid, ethyl ester–pyridine–water, phenol saturated with water and isopropanol–pyridine–glacial acetic acid–water. Very small amounts of substance can be identified with the method. Author

N66-33699*# National Aeronautics and Space Administration, Washington, D. C.

THE INFLUENCE OF LOW TEMPERATURE ON THE DEVELOPMENT OF MICROORGANISMS. PART IV: THE INFLUENCE OF LOW TEMPERATURE ON THE GROWTH OF MOLDS [VLIYANIYE NIZKIKH TEMPERATUR NA RAZVITIYE MIKROORGANIZMOV. IV: VLIYANIYE NIZKIKH TEMPERATUR NA RAZVITIYE PLESNEVYKH GRIBKOV]

F. M. Chistyakov and Z. Z. Bocharova May 1966 11 p refs Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 7, 1938 p 838–842

(NASA-TT-F-10145) CFSTI: HC $1.00/MF $0.50 CSCL 06H

The effect of temperatures of −8° C on the growth of various species and strains of mold on cold-storage meat and fish is discussed briefly. Tabulated data show that the delay in the appearance of visible growth is especially great shortly above the limiting temperature. Visible growth of Chaetostylum Fresenii appeared only after 13 months on wort-agar, whereas on fresh beef it appeared 8 months after inoculation and placement in cold storage. Thamnidium elegans gave no growth on fresh beef in 12 months but showed visible growth on wort-agar with 20% sugar after 54 days. Longest (441 days) and shortest (54 days) delays were observed with Oospora sp. The data show that low temperatures affect different species and strains of molds differently and that −8°C does not constitute the lower limits for development of molds. Author

N66-33709# Joint Publications Research Service, Washington, D. C.

EFFECT OF SUPER-HIGH ELECTROMAGNETIC WAVES ON MICE

V. A. Pukhov 9 Aug. 1966 9 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 9, no. 6, Nov.–Dec. 1965 p 72–73

(JPRS-36906; TT-66-33336) CFSTI: $1.00

The irradiation of mice, treated with the narcotic medinal and the stimulant caffeine, by superhigh frequency waves with a power density of 50 milliwatts/cm^2 is reported. In mice asleep under the effect of the narcotic, as well as in non-narcoticized mice, excitation was observed at the start of irradiation which subsequently changed to inhibition. The disinhibited effect of the waves was inversely proportional to the narcotic dose. Under 100, 200, and 400 mg/kg doses of medinal, the lifespan of the mice increased during irradiation, while after 30 to 150 mg/kg doses of caffeine the lifespan shortened. Hypothermia originating under the effect of medinal is cited as the apparent cause of the resistance of the central nervous system to the superhigh frequency radiation. It is concluded that under such radiation, a disinhibition of the central nervous system originates first with a subsequent increase in the duration of the narcotic effect. Artificially induced moderate inhibition of the central nervous system leads to an increased resistance to irradiation with microwaves; excitation reduces the resistance. E.A.O.

N66-33725*# National Aeronautics and Space Administration, Washington, D. C.

AN IMPORTANT STEP IN SPACE MEDICINE. SOME RESULTS OF THE EXPERIMENT ON THE COSMOS 110 SATELLITE [VAZHNYY ETAP KOSMICHESKOY MEDITSINY. NEKOTORYYE ITOGI EKSPERIMENTA NA SPUTNIKE "KOSMOS-110"]

V. N. Pravetskiy, N. N. Gurovskiy, B. B. Yegorov, and A. A. Kiselev Aug. 1966 6 p Transl. into ENGLISH from Turkm. Iskra (USSR), 19 May 1966 p 4

(NASA-TT-F-10243) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Short (under 14 days) flights have shown no detrimental effect of weightlessness to the human organism, but longer tests show possible impairment to physiological functions; weakening of the cardiovascular system with shifts in body position and increased body excretion of calcium salts. Wider in-flight and post-flight testing conditions on animals in the Cosmos 110 flight greatly expanded research. Disruptions of the motor apparatus (reduced volume of muscle mass and impaired motor coordination), weight loss, increase of calcium in blood and urine, fluctuations in cardiac contraction, and gastro-intestinal upset were observed and evaluated in terms of their applicability to man. Author

N66-33726# Advisory Group for Aerospace Research and Development, Paris (France).

COLLECTED PAPERS PRESENTED AT THE TWENTY-SECOND MEETING OF THE AGARD AEROSPACE MEDICAL PANEL

Sep. 1965 543 p refs Meeting held at Fuerstenfeldbruck Air Base, West Germany, 2–6 Sep. 1965

(AGARD-CP-2) CFSTI: HC $5.93/MF $2.75

Papers on thermal and vestibular problems, psycho-physiology, cardiovascular and respiratory problems, environment, acceleration and vibration, and aeromedical research equipment are presented. For individual titles see N66-33727–N66-33759.

N66-33727# Defence Research Medical Labs., Toronto (Ontario).

VESTIBULAR PROBLEMS IN ROTATING SPACECRAFT

K. E. Money *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 1–8 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Hazards to astronauts working in a rotating environment are examined. Semicircular canal stimulation, or Coriolis acceleration, can cause motion sickness, instability of body posture while moving, or a decrement in visual acuity during head movements. It is proposed that from the point of view of vestibular physiology, zero g is acceptable for long term manned space flights, however rotation rates of 3 to 5 rpm are hazardous. Evidence supporting these conclusions is given, and it is stated that if spacecraft must be rotated to solve other problems, the rotation should be slow enough to avoid vestibular problems. H.S.W.

N66-33728# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE EFFECTS OF THE DIRECTION OF A LINEAR ACCELERATION VECTOR ON POST-ROTATIONAL VESTIBULAR RESPONSES IN MAN

A. J. Benson and M. A. Bodin *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 9–22 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Experiments were conducted to examine post rotational vestibular responses and the extent to which these are dependent on the direction of the prevailing linear acceleration vector. Particular attention was given to subjective after-sensations, because it is these which confict with vertical cues and, in flight, may cause spatial disorientation. These experiments demonstrated that the duration of post rotational sensation and the rate of decay of post rotational nystagmus were influenced by the orientation of the subject to the gravitational acceleration, and that the magnitude of this effect differed according to whether the lateral or vertical canals were stimulated by the angular motion. The experiments are described and the implications of the experimental findings to problems of aerospace medicine are briefly discussed. H.S.W.

N66-33729# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

MOTION SICKNESS DURING FLYING TRAINING

T. G. Dobie *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 23–32 (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Tests were conducted to determine if it was possible to assess an individual's susceptibility to motion sickness and to attempt to reduce the incidence of this condition by some form of ground vestibular exercise. The simulator used in described and the cupulograms obtained are shown. The subjects were divided into groups having a history of motion sickness, those having no history of motion sickness, and those who have become acclimatized by flying experience. The data obtained seems to indicate that ground vestibular exercises may lead to the loss of less flying training time because of motion sickness. H.S.W.

N66-33730# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

THERMAL PROTECTION PRINCIPLES

Alice M. Stoll and Maria A. Chianta *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aersopace Med. Panel Sep. 1965 p 33–48 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

This study concerned protection against intense thermal exposures which produce burns as opposed to protection against heat loss or gain due to long term environmental heat exchange. It is stated that the basic thermal protection principle is the prevention of the establishment, for significant periods of time, of tissue temperatures above 44°C. In convective heating, the heat transfer mode must be limited to that of low temperature radiation by air spaces between the insulating material and the skin. Further protection may be afforded by a second layer of resistant material. In conduction heating, heat transfer can only be reduced by a suitable thickness of appropriate material. In high intensity radiation, the most effective measures depend upon control of the optical properties of the exposed material so that transmittance is eliminated, and transfer of absorbed energy is confined to modes of conduction and low temperature radiation. It is additionally emphasized that the characteristics of the hazard must be considered in thermal protection investigations. H.S.W.

N66-33731# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Laboratoire de Medecine Aerospatiale.

EXPERIMENTAL STUDY OF THE COEFFICIENTS FOR HEAT EXCHANGE BY CONVECTION [COEFFICIENTS D'ECHANGE DE CHALEUR PAR CONVECTION ETUDE EXPERIMENTALE]

J. Colin and Y. Houdas *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 49–72 refs In FRENCH; ENGLISH Summary (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Aerodynamic heating of supersonic aircraft has reversed the problem of creating habitable temperatures in the cockpit. For a long time, the objective was to heat the cabin; nowadays, it must be cooled—the more drastically, the greater the speed of the aircraft. In calculating the required heating/cooling, the different ways of the human body's heat exchange to avoid overheating is considered. As is well known, this exchange takes place in four principal ways: conduction, convection, radiation, and evaporation. Some of these are well documented; others have been subjected to only limited experimentation. Among the latter, the literature on convection is relatively scanty; in addition, great divergences exist among the coefficients formulated by different researchers. The authors describe their experimental approach to this problem, and the determination of a coefficient based on the data obtained. Author

N66-33732# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

SOME ASPECTS OF PERSONAL COOLING IN INADEQUATELY AIR CONDITIONED COCKPITS

J. M. Clifford *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 73–86 (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Data are presented from tests conducted using an air ventilated flying suit, and a water cooled flying suit, in research to find a means for maintaining a comfortable body temperature for aircrew members. The tests showed that each suit provided adequate personal comfort, however when wearing the water cooled suit a dangerous situation may occur if the cooling system fails during flight. It is stated that a personal cooling system using both air and water should prove to be the most advantageous. H.S.W.

N66-33733# Entwicklunging Sud, Munich (West Germany).

PSYCHOPHYSIOLOGICAL AND HUMAN ENGINEERING CONSIDERATIONS IN THE INSTRUMENTATION AND CONTROL OF VTOL AIRCRAFT

H. von Diringshofen and W. Burkhardt *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 87–93 (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The psychophysical impact on pilots of the tendency in modern aviation technology towards automatic aircraft controls, particularly in VTOL aircraft, is assessed. This problem is discussed in terms of the following psychological and human engineering problems: (1) A rejection of increasing automation on the part of the pilots, (2) A reluctance of some aircraft designers with regard to the complex automatic controls whose reliability has not always been sufficiently proved, (3) The problem of training pilots to quickly intervene when automatic systems fail. The consequences of these problems in the field of aviation medicine are briefly discussed. H.S.W.

N66-33734# School of Aerospace Medicine, Brooks AFB, Tex.

SERIAL SAMPLING OF PAROTID FLUID FOR 17-HYDROXYCORTICOSTEROID LEVELS AS A QUANTITATIVE ESTIMATE OF STRESS DURING FLIGHT IN HIGH-PERFORMANCE JET AIRCRAFT

B. H. Warren, I. L. Shannon, and S. D. Leverett, Jr. *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 95–108 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

A series of experiments were conducted to measure 17-hydroxycorticosteroid levels under relatively nonstressful conditions in research to obtain indications of inflight biochemical response to stress. The results of these experiments are presented and assessed. The subjects selected for study included

experienced pilots and nonpilots. It was found that steroid responses between pilots and nonpilots, while passively sitting in the rear cockpit of the aircraft, differ markedly. The 17-OHCS production of pilots fluctuates more markedly than that of nonpilots, and high levels occur during critical phases of flight. It is stated that these experiments represent a preliminary study; however, experiments of this type will allow the comparison of biochemical with bioelectronic parameters to obtain a more integrated understanding of human reactions to inflight conditions. H.S.W.

N66-33735# Bureau of Medicine and Surgery, Washington, D.C.

RECOVERY RATES WITH DESCENT FROM HYPOXIA-INDUCED PERIPHERAL VISUAL FIELD LOSS

W. L. Smith *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 109-118 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The loss of the peripheral visual field at altitude and recovery rates with descent were studied. A total of five subjects were measured at elapsed time intervals at 18,000 ft of altitude for determination of the magnitude of peripheral visual field loss. Results showed a substantial loss in the order of 16-17 percent at the end of the 20-minute elapsed time interval. Recovery rates were found to be rapid with measuring done at 5,000 ft after descent at 5000 fpm, and at ground-level pressures after a descent at 500 fpm to simulate letdown descent rates. Results from ground-level measurements indicated an overall terminal recovery of 14.7 percent of the original baseline visual field area. General recommendations for further studies were made. Author

N66-33736# Office National d'Etudes et de Recherches Aeronautiques, Paris (France). Centre Principal d'Expertise Medicale du Personnel Navigant de l'Aeronautique.

USES OF ELECTRORETINOGRAPHY IN THE DETERMINATION OF THE NIGHT VISION CAPACITY OF AVIATORS [INTERET DE L'ELECTRORETINOGRAPHIE DANS L'APPRECIATION DE LA CAPACITE VISUELLE NOCTURNE DES NAVIGANTS]

A. Mercier, G. Perdriel, and J. Chevaleraud *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 119-123 refs In FRENCH; ENGLISH summary (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Night vision capacity of aviators can be determined by establishing gross and morphoscopic light thresholds and mesopic or scotopic campimetry. These techniques require the cooperation of the subject, since the validity of the examination results depends upon the accuracy of the subject's answers. The electroretinographic examination is an objective procedure which demonstrates the action of the "62" (scotopic) wave. It is of diagnostic, prognostic and therapeutic value in cases of possible hemeralopia in an aviator. Author

N66-33737# School of Aerospace Medicine, Brooks AFB, Tex.

REGIONAL BLOOD FLOW DISTRIBUTION IN PROFOUND EXPERIMENTAL HYPOTHERMIA: A TECHNIQUE FOR DEFINITION OF BLOOD FLOW PATTERNS IN CRITICAL ORGANS DURING HIGH ACCELERATION STRESS

M. D. Turner, H. L. Stone, S. D. Leverett, Jr. *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 125-138 (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Details are given on a method using needle shaped hydrogen electrodes to measure local blood flow in tissue without access to the arterial or venous supply. The method was used to study the amount of blood that perfuses the various body tissues during hypothermia in the warm blooded non-hibernator. The experimental procedure is discussed and charts which summarize the data obtained are provided. Additionally it was determined that the hydrogen gas technique was valuable in the study of blood flow distribution during exposure to accelerative stress. An experiment conducted using this technique is also briefly described. H.S.W.

N66-33738# School of Aerospace Medicine, Brooks AFB, Tex.

THE DISTRIBUTION OF PULMONARY BLOOD FLOW IN HUMAN SUBJECTS DURING ZERO-G

H. L. Stone, B. H. Warren, and H. Wagner, Jr. (Johns Hopkins Univ.) *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 139-148 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

A method is described to measure pulmonary blood flow distribution in man, while in a zero gravity environment, using macroaggregated human serum albumin labled with I^{131} The weightlessness was produced by parobolic flight in a NF-100F aircraft. A shift was observed toward the apex of the lung during weightlessness which is more noticeable in the left lung field than in the right lung field. The data from these tests were compared to data obtained from subjects that were subjected to weightlessness while in a supine position. A significant upward shift of blood flow was found when the subject was in the supine position. The results of these tests are briefly discussed. H.S.W.

N66-33739# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Laboratoire de Medecine Aerospatiale.

RECENT ASPECTS OF RESPIRATORY PHYSIOLOGY DURING TRANSVERSE ACCELERATION

Ch. Jacquemin, P. Varene, J. Demange, and J. Timbal *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 149-177 refs In FRENCH; ENGLISH summary (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Measurements of respiratory resistance by the interrupter technique confirm that transverse accelerations determine a restrictive respiratory syndrome without the participation of an overall obstructive syndrome. The magnitude of the restrictive syndrome tends to be reduced by a governing mechanism opposing thoractic compression. Similar facts were found both during artificial weighting down of the trunk and during respiration under negative pressure. It is stated however, that a comparison between these two situations is not justified. It is hypothesized that respiration under depression tends to be performed relatively homogeneously as a function of the way in which pressures are transmitted within the mechanical respiratory system, while transverse accelerations cause a modification to the distribution of the heterogeneous gas blood system as a function of the centrifuging. Justifications for these hypotheses are given. H.S.W.

N66-33740# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

COMPLEX REACTION TIMES AT A SIMULATED CABIN ALTITUDE OF 8,000 FEET

F. Ledwith and D. M. Denison *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 179-197 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Tests were conducted to confirm the experimental evidence suggested that pilot performance deterioration is detectable while breathing air at a pressure equivalent to an altitude of 8,000 ft, and while breathing in an environment equivalent to air breathing at ground level. Details are given on the form of the experiment, the decompression chamber, the production and monitoring of the gas environment, and argometer used, the apparatus for presentation of the task, and the instructions to the subjects. The results of the tests are given and it is reported that the ability to learn a task, involving spatial transformations of the stimulus materials, appears to be impaired by exposure to a cabin altitude of 8,000 ft. H.S.W.

N66-33741# Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

ABSORPTIONAL ATELECTASIS BREATHING 100 PER CENT OXYGEN AT SIMULATED ALTITUDE: PREVENTION USING INERT GAS

T. Turaids *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 201-208 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Four out of seven subjects exposed to a 100% oxygen atmosphere at 258 mmHg (5 psi), 72 hours, 380 mmHg (7.5 psi), 72 hours, or at sea level (14.7 psi) for 24 hours, developed a decrease in vital capacity, and of these four, two had evidence of atelectasis by X-ray. One of these subjects, who had twice developed atelectasis in a 100% oxygen atmosphere at 5 psi, was re-exposed to mixtures of oxygen with 30%, 5%, or 2.5% nitrogen at 5 psi. This subject consistently developed atelectasis when the nitrogen concentration was 2.5% or below, whereas no lung pathology was observed when nitrogen in the atmosphere was present at 5% or 30%. The role of inert gas in preventing the development of atelectasis is discussed. Author

N66-33742# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

COMPARISON OF CARDIOVASCULAR REACTIONS ORIGINATED BY DIFFICULT HELICOPTER FLIGHT PATTERNS AND PHYSICAL WORKLOAD

E. A. Lauschner and H. W. Kirchhoff *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 209-222 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The results of laboratory functional testing of cardiovascular and respiratory reactions and efficiency were compared with the values obtained by telemetric monitoring under difficult flying conditions to determine if and where relations exist between the results of the two methods. The subjects used in the tests were experienced helicopter pilots and data are given from ECG, pulse rate, blood pressure, and regulatory mechanism measurements. The results of both tests are compared and it was found that the conclusions drawn from the laboratory test results seem to be fully applicable to the combined stresses of actual flying. H.S.W.

N66-33743# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Office of Director for Research and Development.

ENGINEERED ATMOSPHERES FOR FUTURE AEROSPACE OPERATIONS

A. G. Swan *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 223-232 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The need for close coordination between the environmental physiologist and the spacecraft designer is highlighted in this reivew of research conducted to evaluate candidate atmospheres for spacecraft applications. The discussion includes atmospheric composition and pressure considerations as well as rapid decompression. The candidate atmospheres which would allow the engineer a choice of an atmosphere for anticipated aerospace missions are listed and a summary of the validation studies completed in these atmospheres in included. Tests are also described, in which dogs and monkeys were used, to determine the effects of rapid decompression. The major conclusions from these research efforts are listed. H.S.W.

N66-33744# Aerospace Medicine Center, Rome (Italy).

BEHAVIOUR OF ARTERIAL OXYGEN SATURATION AND OF PULMONARY VENTILATION IN DOGS SUBJECTED TO $+G_x$ ACCELERATION

A. Dagianti (School of Med., Rome, Italy), E. Busnengo, F. Rossanigo, and P. Rota *In* AGARD Collected Papers Presented at the 22nd Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 233-243 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The results of 96 experiments conducted to examine the behavior of arterial saturation in oxygen and pulmonary ventilation in dogs subjected to prolonged acceleration of constant value, in the $+G_x$ axis are presented and assessed. Tables which summarize these results are provided and it was noted that diminution of the saturation in oxygen of the arterial blood in proportion to the acceleration value occurred. The peak was reached during the first minutes of the experiment. Additionally, initial apnea followed by a phase of hyperventilation, which persisted throughout the experiment and increased with the number of G, was observed. These indications are compared to those reported by previous investigators, and it is stated that the phenomenon of initial apnea merits additional investigation. H.S.W.

N66-33745# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Laboratoire de Medecine Aerospatiale.

MEDICO-PHYSIOLOGICAL INCIDENCES ON THE PILOT FOR FLIGHT PATTERNS TYPICAL OF VTOL [INCIDENCES MEDICO PHYSIOLOGIQUES SUR LE PILOTE DES CONFIGURATIONS DE VOL PROPRES AU VTOL]

R. Auffret and H. Seris *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 245-257 In FRENCH; ENGLISH summary (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The mechanical complexity of VTOL operation is assessed, and it is pointed out that the procedures developed for low speed flight pose new problems for the pilot. These are in addition to such difficulties as the altitude and speed encountered in normal high performance aircraft, and the various phases of take-off, transition, and landing on a pinpoint location. Principal medico-physiological hazards to the pilots are identified as (1) the permanent breathing of 100% oxygen under pressure, due to the danger of air polution in the cabin from the exhaust gases surrounding the aircraft; (2) low frequency vibrations; and (3) the need for a safe low altitude bailout method. Areas for further research are delineated, based on flight testing of various prototypes. M.G.J.

N66-33746# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

AEROSPACE TOXICOLOGY RESEARCH

Anthony A. Thomas *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 259-278 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Three major areas of aerospace toxicology research are discussed briefly. In propellant toxicology, emphasis is focused on characterizing tolerance to high level, short duration exposure, and on establishing emergency tolerance limits (ETL) for missile operators. Consideration is also given to beryllium toxicity and the differences in response of the lung tissue between various animal species. Environmental pollution research includes laboratory and greenhouse studies involving all newly synthesized propellants and combinations of fuels and oxidizers. Such propellants, propellant ingredients, and combustion products are listed, and summary data are presented on fumigation studies of hydrazine, unsymmetrical dimethylhydrazine, and nitrogen dioxide. The environmental toxicology of space cabins is also under study. Details are given on an inhalation exposure facility for determining the effects of low atmospheric pressure and oxygen rich atmospheres on the characteristics of uninterrupted long term exposure to toxic gases and vapors encountered in space cabin atmospheres. M.G.J.

N66-33747# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

A SURVEY OF AN RAF DECOMPRESSION TEST AT 28,000 FEET

D. I. Fryer *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 279-293 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Approximately 5000 test records of airmen subjected to decompression tests at 28,000 feet were analyzed to determine the rate and type of failure, the individual factors involved, and the validity of the test. Symptoms are grouped according to bends, chokes, central nervous system, skin, and circulatory, with 89.1% of the total breakdowns attributed to bends. Observed and chance distribution of multiple occurrences are listed, and relationships are drawn between age and susceptibility, and weight and susceptibility. The time of onset of symptoms and the time of forced descent are plotted. Repeatability data are analyzed, and results indicate that a true individual susceptibility exists. M.G.J.

N66-33748# Bureau of Medicine and Surgery, Washington, D. C.

DESIGN REQUIREMENTS FOR LIFE SUPPORT HELMETS

Roland A. Bosee *In* AGARD Collected Papers presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 295-305 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Impact accidents for all categories of Navy aircraft are summarized, and four helmets developed for pilot protection are shown. These are designed for use by attack and fighter pilots, patrol plane pilots, and helicopter crewmen. Development efforts on proposed life support helmets are discussed, in relation to the major research areas. These include (1) test methods for determining helmet displacement relative to the head; (2) impact resistance properties of lightweight materials suitable for shell construction; (3) test methods and apparatus for determining helmet center of mass; (4) head-neck dynamics under severe deceleration forces; and (5) helmet sizing or fit, and its influence on comfort. M.G.J.

N66-33749# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

THE EFFECTS OF VIBRATION ON HUMAN PERFORMANCE

C. Stanley Harris and Richard W. Shoenberger *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 307-326 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Vibration studies are reviewed, and details are given on experiments conducted to determine the effects of vibration frequency on human performance, to compare the effects of sinusoidal versus random vibration, and to examine the performance effects of vibration as a function of the duration of exposure. The different amplitudes and peak G administered to the subjects in three experiments are listed, and the variances for the vertical tracking scores are analyzed. Results indicate that the increase in horizontal error as a result of vibration was negligible for the G levels used for all three frequencies, the vertical error showed a significant effect due to G levels. Studies directed toward comparing the performance effects of sinusoidal and random vibration resulted in the failure to find a significant effect for vibration conditions. Although it was concluded that sinusoidal and random vibration have the same effect on performance, the experimental restrictions imposed in the study are pointed out. M.G.J.

N66-33750# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

THE INFRASONIC NOISE ENVIRONMENT IN AEROSPACE OPERATIONS

Elizabeth Guild *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 327-342 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Data on the effects of low frequency sound on man are reviewed, based on observations made in operational environments and preliminary studies conducted under laboratory conditions. Representative noise spectra generated by turbojet aircraft operating in afterburner during ground maintenance are depicted. Extrapolation of the curve showing the maximum level of infrasound to a distance of about 6000 ft indicate that the surrounding communities receive significant levels of acoustical energy in the range below which the hearing organ responds. Noise spectra measurements during liftoff and early flight of the Saturn SA-1 are assessed. Results of exposures of five noise-experienced military subjects to wideband noise environments point up the importance to subjective sensations of the relative amount of high frequency energy present in the spectrum. Laboratory tests indicate that current and anticipated infrasound levels offer no problem to persons directly exposed in the near field. However, from the long range viewpoint, it is concluded that infrasound may induce direct adverse responses unless positive measures for its control are developed and applied. M.G.J.

N66-33751# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Laboratoire de Medecine Aerospatiale.

MEASUREMENT OF LOW-FREQUENCY VIBRATIONS IN BIG HELICOPTERS AND THEIR TRANSMISSION TO THE PILOT [MESURE DES VIBRATION DE BASSE FREQUENCE SUR HELICOPTERE LOURD ET LEUR TRANSMISSION AU PILOTE]

H. Seris and R. Auffret *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 343-354 refs In FRENCH; ENGLISH Summary (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Analyses are presented of the vibrations recorded at the seat level and on the sternum and cranium of the pilot. Sources are identified as (1) very low frequency vibrations due to atmospheric turbulence occurring at low altitudes and in clouds; and (2) vibration caused by mechanical factors in the main rotor and the anti-torque rotor. The frequencies transmitted to the cockpit are multiples of the number of blades of the frequency

of rotor rotation. The helicopter used produced mechanical vibrations of 20 Hz and above, caused principally by the main rotor. The damping function of the body upon increased frequencies is demonstrated, with the resonant frequencies of the human body found in the 4 to 6 Hz region in seated subjects. Between 25 and 30 Hz, an over-acceleration of the head in relation to the shoulder was observed. Above 6 Hz, a damping effect occurs especially in the longitudinal axis. The problem of damping very low frequencies (2 to 6 Hz) is considered the most difficult to solve; deflections of several units of 10 cm would be necessary to reduce the resonance of the seat–pilot system below these figures. M.G.J.

N66-33752# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

THE DYNAMIC SIMULATION OF TURBULENCE PENETRATION

Lloyd Hitchcock, Jr. and Randall M. Chambers *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 355–394 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The incidents, accidents, and crashes involving swept wing airline jet transport aircraft during routine flights into atmospheric turbulence are summarized, and the basic problem areas are identified. Details are given on studies aimed at providing flight crews with accurate information, adequate aircraft systems, and appropriate procedures for optimal control during atmospheric turbulence, and in providing pilots with adequate training for safely flying the aircraft under such conditions. The turbulence environment is examined, and possible causes of control error are considered. Two turbulence simulation programs are described. In one, a vertical oscillator with a throw of plus and minus approximately 50 ft simulates the higher frequencies of jostle and buffet accelerations, but is unable to duplicate the lower frequency exposures resulting from flight path variations. In the other, a human centrifuge is used to investigate factors contributing to commercial jet aircraft crashes. Computer mechanization diagrams are included. M.G.J.

N66-33753# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

BIOLOGICAL PARAMETERS OF IMPACT

W. K. Brown and R. F. Chandler *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 395–407 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The problems encountered, and the experimental approaches employed in establishing useful tolerance criteria to abrupt acceleration are discussed. Although a mathematical model which represents the dynamic system is considered necessary to understand the response of the system, only the most simple models have been investigated. This is due to the lack of definition of the physical characteristics of the body, and the complex mathematics needed to describe the dynamic reaction. The model most frequently used is a simple spring mass system, with the major elements of the biological system represented by equivalent mechanical elements. These elements appear as lumped masses in the model supported by springs and dashpots which represent the force transmission system (skeletal) and energy dissipation system (soft tissue) of the body. Details are also given on 288 human impact tests using 24 different subject orientations with respect to the force vector. The most significant physiological response was that of post-impact slowing of the heart rate. Graphical data are also included on other biological responses; these are considered promising as tolerance indicators. M.G.J.

N66-33754# Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

PHYSIOLOGICAL ENDPOINTS IN ACCELERATION RESEARCH

Kenneth R. Coburn *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 409–428 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The problems inherent in creating equivalent acceleration environments on centrifuges of differing characteristics are assessed, along with the difficulties involved in creating equivalent acceleration environments for each of two subjects on the same centrifuge. The responsibility of the investigator in experimentation with human subjects is defined from the legal standpoint. Variables in the acceleration environment are considered, and it is suggested that coordinates with reference to the centrifuge car or carriage be used in determining a fixed location for a central reference transducer. The importance of locating the body in a consistent manner in reference to the centrifuge geometry is stressed, along with the need of certain anthropomorphic measurements of each subject. The theory of endpoints is reviewed, and auditory phenomena, electroencephalography, visual, and cardiorespiratory endpoints are discussed. Examples are included to indicate the degree of difference which exists between two subjects experiencing grey-out and black-out. M.G.J.

N66-33755# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

ACCELERATION TRAINING FOR ASTRONAUTS AND TEST PERSONNEL

Randall M. Chambers and Lloyd Hitchcock, Jr. *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 429–468 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Concepts and technology relating to centrifuge utilization, with emphasis on the development of dynamic flight simulation techniques, are presented. Details are given on the training programs developed for the Mercury, Gemini, and Apollo astronauts; the Dynasoar (X-20) space pilots; and the aerospace research test pilots. The general acceleration training principles which were derived from these centrifuge simulation and training projects are assessed. These include physiological tolerance, performance tolerance limits, predictions of performance tolerance from physiological tolerance, g-protection, visual decrement, individual differences, acceleration training and practice effects, display characteristics, control devices, feedback sensitivity, task difficulty, higher mental processes, emotional processes, effects of combined stresses, and characteristics of performance decrement and error. Summary data are also presented on the results of experiments involving restraint systems, displays, controls, pressure suit conditions, and acceleration variables. M.G.J.

N66-33756# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

A MINIATURIZED 7-CHANNEL TELEMETRY SYSTEM FOR MEDICAL RESEARCH

A. R. Marko *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 469–476 refs (See N66-33726 19-04) CFSTI: HC $5.93/$2.75

Details are given on the development of a 7-channel miniature telemetry system employing pulse duration modulation. In the first models, the following signal conditioners are incorporated: channel 1, high gain differential amplifier for monitoring electroencephalogram; channels 2 and 3, medium gain differential amplifiers for electrocardiograms; channel 4, respiration circuit to be used with mercury strain gauge or

thermistor; channel 5, galvanic skin resistance measuring circuit in the 5 to 100 kilo-ohm range; channel 6, amplifier for detecting specific responses in galvanic skin resistance; and channel 7, thermistor circuit to be used for measuring body or skin temperature. Basic limitations of the system are noted. A circuit diagram is included, and it is pointed out that the multiplexer design lends itself to future microminiaturization using already developed microelectronic building blocks.
M.G.J.

N66-33757# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

MULTISTATION MONITORING DURING RAPID DECOMPRESSION

T. G. Dobie *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 477-485 (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Physiological monitoring, applied to training aircrew in the use of partial pressure equipment assemblies, is described. The assemblies consist of a partial pressure jerkin, an anti-g suit acting as a pressure garment, and either a pressure demand oxygen mask or a partial pressure helmet depending on the breathing pressures required. The maximum breathing pressures are reached at ground level by a graduated series of training runs. The first run at each new breathing pressure is monitored, with a medical officer alongside the subject. Simultaneously another medical officer is observing the physiological responses on a pen recorder; the recording consists of inspiratory flow, ventilation volume, and lead two ECG. On completing the ground level training, the subject is given a rapid decompression appropriate to his aircrew equipment assembly and aircraft type. The advantages of multistation monitoring are cited, and details are given on a flexible layout involving three decompression chambers, sight and voice communication between the medical officers, and provision for a constant visual cross-reference facility for the officer carrying out the monitoring.
M.G.J.

N66-33758# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

VISION RESEARCH FACILITY AT AEROSPACE MEDICAL RESEARCH DEPARTMENT

Gloria T. Chisum, J. B. Lyons, and J. H. Hill *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 487-498 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

Details are given on the vision research facility which consists of automated monocular and binocular optical systems controlled by an automatic digital control and data recording system. The monocular system presents up to four superimposed 60° visual fields to an observer: an ambient light field, a fixation target, a test target, and a background. In the binocular system, each beam contains essentially collimated regions to permit the use of interference filters, focal points at which shuttering and chopping of the light can be accomplished, and an afocal region in which field size and target presentation are effected. The accessory apparatus consists of various instruments which are used to calibrate and monitor stimuli, and to make electrophysiological measurements on experimental observers. To illustrate the integration of the systems, experimental conditions are given for a problem which requires information as to the relative rates of dark adaptation for personnel who have been working in green or red lighted areas.
M.G.J.

N66-33759# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

THE CENTRIFUGE METHOD OF DYNAMIC FLIGHT SIMULATION

R. J. Crosbie *In* AGARD Collected Papers Presented at the 22d Meeting of the AGARD Aerospace Med. Panel Sep. 1965 p 499-523 refs (See N66-33726 19-04) CFSTI: HC $5.93/MF $2.75

The evolution of the centrifuge method of dynamic flight simulation is summarized in relation to the modernization program which was undertaken to achieve the desired safety, simplicity, and versatility imposed by new performance requirements and increased use of the facility. Special features of the program are identified as a new centrifuge control center, an interchangeable capsule concept, a larger gondola, a stronger centrifuge arm and gimbal ring, increased slipring capacity, increased number of rotary joints, increased rotational movement of the outer gimbal, new jack panels and wiring to the hub sliprings, new intercommunciation system, third gimbal axis and oscillating platform capsule compatibility, large circuit breakers in the main generator circuit, new lower bearing in main accelerator motor, environmental control console, vacuum caps for the new gondola, and centrifuge building annex. Physical limitations of the centrifuge method, inherent in dynamic flight simulation, are defined. However, notwithstanding these limitations, it is believed that the performance potential of the centrifuge system will satisfactorily meet the requirements of the scheduled and contemplated simulation programs.
M.G.J.

N66-33764*# National Aeronautics and Space Administration, Washington, D. C.

CHANGES IN APPETITE FOR WATER, GLUCOSE, SODIUM, AND POTASSIUM IN RATS WHEN THE SODIUM PUMP IS INHIBITED BY STROPHANTHIN-K [IZMENENIYA APPETITA K VODE, GLYUKOZE, NATRIYU I KALIYU U KRYS PRI UGNETENII NATRIYEVOGO NASOSA VVEDENIYEM STROFANTINA K]

A. M. Ugolev and G. M. Roshchina Jun. 1966 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 165, no. 5, 1965 p 1211-1214
(NASA-TT-F-10200) CFSTI: HC $1.00/MF $0.50 CSCL 06C

It is found that strophanthin inhibits sodium appetite and stimulates potassium and water appetites. With strophanthin administration there is increased water appetite, decreased glucose consumption, decreased sodium consumption, and increased potassium consumption.
Author

N66-33780# Library of Congress, Washington, D. C. Aerospace Technology Div.

THE EFFECT OF ACCELERATIONS ON THE VESTIBULAR ANALYZER Surveys of Foreign Scientific and Technical Literature

Janice L. Smith 3 Jun. 1966 29 p refs
(ATD-66-62)

This bibliography was compiled from Soviet open sources published 1955-1966 together with 5 Western sources. It is the first report in a series and deals with the effect of angular, impact, and Coriolis accelerations on the vestibular mechanism. The bibliography is divided into two sections. The first section consists of 112 items which were considered of primary interest. The second part contains 27 items considered of secondary interest because they contained elementary or background information or had only a few relevant paragraphs. Pertinent information included: diagnostic value of labyrinthine reactions, changes in the frequency spectrum of an encephalogram during vestibular and optokinetic stimulation, cortical regulation of vestibular reactions, stimulation of the vestibular apparatus of a dog, development of conditioned vestibular reflexes, biological and physiological studies in rocket and satellite flights, physiological effects of gravitation, spatial

orientation, equipment for study of the vestibular analyzer, effect of prolonged acceleration motion sickness, vestibular training. Author

N66-33825# Yale Univ., New Haven, Conn. Dept. of Biology.
POLARIZED LIGHT AND THE FUNCTIONAL ORGANIZATION OF THE COMPOUND EYE Final Report, 1 Jul. 1957–30 Jun. 1964
Talbot H. Waterman 1965 14 p refs
(Contract Nonr-609(23))
(AD-620756) CFSTI: HC $1.00/MF $0.50

The long range aim of this research program was to investigate the mechanism and biological significance of the polarized light sensitivity of arthropods first demonstrated in the honey-bee by Karl von Frisch in 1948. The operational objectives of the work naturally developed in ways which were not completely anticipated at the beginning so that three related, yet distinct, lines of research were in fact pursued under the subject contract. Their objectives were: (1) electrophysiological study of arthropod compound eyes with particular reference to their sensitivity to plane polarized light, (2) measurement of polarization of natural submarine light as well as the factors which affect it and (3) analysis of polarized light orientation (polarotaxis) in aquatic animals both in the laboratory and in the field. Author (TAB)

N66-33826# Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
STRESS
Joseph Weitz Apr. 1966 43 p refs
(Contract ARPA SD-50)
(IDA/HQ-66-4672; P-251; AD-633566) CFSTI: HC $2.00/MF $0.50

A brief section describes some areas of possible military interest in studies of stress-selection, classification, training, human factors and systems research and, of course, stress as related to the combat situation, among others. Since there is difficulty in accurately defining stress, it was considered most useful to describe stimulus situations which may lead to what is called stress and responses which may occur as a result of the 'stress' situation. The stimuli considered are speeded information processing, overloading, environmental factors, perceived threat, physiological stimulation, isolation, confinement, blocking and frustration, and finally group pressures. The responses discussed are performance decrement, immobilization, inappropriate responses, physiological changes, verbal report, and performance enhancement, considering the stimulus situations which lead to stress and the responses which may be evoked as a result of certain stimulus situations. An attempt is made to suggest research areas which may prove useful in better understanding the stress mechanism and its effect. Author (TAB)

N66-33833# Malecki Labs., Inc., Chicago, Ill.
RESEARCH ON THE BASIS OF COLD INJURY Final Report, 1 Jan.–31 Dec. 1965
George J. Malecki and Basil J. Luyet [1965] 77 p refs Prepared in part with Am. Found. for Biol. Res.
(Contract Nonr-4764(00))
(AD-634045) CFSTI: HC $3.00/MF $0.75

The objective of the research study was to design, develop, and fabricate instruments for and to conduct studies on the effect of controlled deionization during slow freezing on viability of biological tissues. The studies included but were not limited to: (1) nature of freezing injury to living cells and, (2) employment of the instruments to study the effect of freezing on blood. Macro- and micro freeze-electrodialysis instruments were designed, fabricated, and placed into operating condition. With the macro unit, controlled deionization during slow freezing under isotonic conditions was achieved initially with a model saline system and subsequently, with blood. The micro unit was employed to observe directly under the microscope the morphology of the erythrocytes during deionization and freezing. Results obtained with the blood samples indicated that improved stability to freezing was not realized with the electrodialysis treatment. Apparently, the passage of electrical current through blood during freezing promotes hemolysis. What is believed to be a significant contribution to the area of blood preservation was achieved when it was found that definitely improved stability to freezing is obtained by separating plasma from whole blood, concentrating and partially deionizing it, and then remixing the concentrated plasma with the erythrocytes. Author (TAB)

N66-33838# School of Aerospace Medicine, Brooks AFB, Tex.
PAROTID FLUID TOTAL PROTEIN IN PATIENTS WITH UREMIA AND PROTEINURIA Final Report, Jan.–Sep. 1965
Richard M. Freeman and Ira L. Shannon Apr. 1966 10 p refs
(SAM-TR-66-41; AD-634053) CFSTI: HC $1.00/MF $0.50

Stimulated parotid fluid samples (238) were collected from 32 patients to determine if altered renal function was associated with deviations in salivary protein levels. Of the 32 patients studied, 10 were in the terminal stages of chronic renal disease, 7 were in the oliguric phase of acute tubular necrosis, and 15 had normal regnal function. There were no significant differences in parotid fluid protein concentration or minute secretion associated with the state of renal function. Author (TAB)

N66-33840# Space/Defense Corp., Birmingham, Mich.
SURVEY OF METHODS FOR GAS ANALYSIS IN RESPIRATORY ATMOSPHERES Final Report
Donald L. Foster and Michael Brian 20 Apr. 1965 62 p refs
(Contract Nonr-4490(00))
(TR65-102; AD-634039) CFSTI: HC $3.00/MF $0.75

It appears that currently available equipment (or available equipment with minor modification) can be adapted to meet the most basic requirements for respiratory atmosphere analysis. However, the optimum characteristics desired are probably not intrinsic to currently available instrumentation. The most limiting factor appears to be the incapability of a single analytical technique to provide acceptable monitoring of the atmospheric composition. It is almost certain that in any system for atmosphere analysis it will be necessary to utilize equipment employing more than one of the analytical methods in use today. TAB

N66-33846# Joint Publications Research Service, Washington, D. C.
CEREBRAL VASCULAR CRISES
V. V. Utkin 12 Jul. 1966 14 p Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 5, 1966 p 91–94
(JPRS-36429; TT-66-32861) CFSTI: HC $1.00

A general discussion is given of cerebral vascular crises, which are defined as acute, brief disturbances of cerebral blood circulation. The discussion includes the causes, symptoms, diagnosis, and methods of cure and treatment. C.T.C.

N66-33856# Universidad Peruana de Ciencias Medicas y Biologicas, Lima (Peru). Instituto de Investigaciones de la Altura.
THE ROLE OF ADRENAL CORTEX IN THE PROCESS OF ACCLIMATIZATION TO HIGH ALTITUDES Annual Report, 1 May 1965–30 Apr. 1966

Federico Moncloa Apr. 1966 20 p refs
(Contract DA-ARO-49-092-65-G89)
(Rept.-1; AD-633760) CFSTI: HC $1.00/MF $0.50

The results indicate that exposure to high altitude (4300 meters) causes a transitory increase in the adrenal cortex secretion of cortisol. The adrenal cortex can be further stimulated with exogenous ACTH during the first day of exposure to an environment of low oxygen tension. It is also possible to inhibit the adrenal cortex hyperactivity by dexamethasone administration. The biological half-life of a synthetic corticotrophin preparation was studied. Using a new formula for calculation results ranged between 19.4 and 38.7 minutes.
Author (TAB)

N66-33913# Texas Univ., Austin. Environmental Health Engineering Research Labs.
RADIOACTIVITY TRANSPORT IN WATER. STRUCTURE AND METABOLISM OF A LOTIC COMMUNITY, PART I (APRIL–JULY 1964)
B. J. Copeland and E. F. Gloyna 1 Feb. 1965 62 p refs
(Contract AT(11-1)-490)
(EHE-02-6501, Pt. 1; TID-22873) CFSTI: HC $3.00/MF $0.75

The various aspects of community metabolism of animals and plants under simulated stream conditions were studied. Calculations were made of total solar input, photosynthetically available light, oxygen and carbon dioxide photosynthesis, oxygen and carbon dioxide respiration, efficiency of the ecosystem, photosynthesis/respiration ratios, and photosynthetic and respiratory quotients. The relation of community metabolism to radionuclide transport and its possible role in future considerations were evaluated. The community metabolism characteristics were at times different from those expected for flowing ecosystems. However, owing to the paucity of similar data for natural or artificial streams, it is not known whether these simulated stream values are to be considered typical or atypical. It was concluded that the relationship of photosynthesis to respiration (P/R ratios) is the prime factor in the uptake and release of ^{65}Zn and ^{58}Co in plants, water, and sediment. Carbon dioxide metabolism appeared to give the most realistic results, since oxygen metabolism values seemed to be affected by the anaerobic phase of the diurnal cycle.
Author (NSA)

N66-33914# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.
ACTION SPECTRA OF THE EFFECT OF ULTRAVIOLET RADIATION ON *"IN VITRO"* DNA OF PHAGE α [SPETTRO D'AZIONE PER L'EFFETTO PRODOTTO DALLA RADIAZIONE ULTRAVIOLETTA SUL DNA DEL FAGO α IRRADIATO "IN VITRO"]
M. Cremonese 17 Nov. 1965 37 p refs In ITALIAN; ENGLISH summary
(ISS-65/45)

Action spectra of the effect of ultraviolet radiation on the physico-chemical properties of the DNA of phage α irradiated *in vitro* were obtained. Using the analytical ultracentrifuge and the spectrophotometer the following effects were studied: (a) production of interruptions in the single polynucleotide strand; (b) local denaturation; (c) presence of a fraction of molecules resistant to denaturation; (d) increase in the buoyant density of irradiated DNA. All of the action spectra thus obtained show a slight variation of the radiation efficiency in the range between 2600 and 2800 Å, and a well-defined peak at $\lambda \simeq 2880$ Å. Threshold values for all of the examined effects are 3000 Å.
Author (NSA)

N66-33915# Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
ON THE RELATIONSHIP BETWEEN RADIATION RESISTANCE AND RECUPERATION ABILITY OF *ARTEMIA SALINA* OOCYTES
P. Metalli and E. Ballardin Nov. 1965 10 p refs Presented at European Soc. for Radiation Biol., Sect. Genet. Effects, Ann. Meeting, Utrecht, 16–18 Sep. 1965
(RT-B10-(65)31; CONF-650968-1)

X-ray-induced dominant (total embryonic) lethality in oocytes of *Artemia salina* shows dose-action curves with a shoulder followed by a nearly exponential relationship at high doses. It was found that the tetraploid occytes are more radioresistant that the diploid ones, as evidenced by a slope ratio of 3 to 4. Further, the threshold is about twice as large and it was suggested that part of the damage could be repaired in all strains and that the tetraploid oocytes might enjoy a greater recuperation efficiency, besides being more resistant. This hypothesis was tested with the split-dose technique on diakinesis (or prometaphase) oocytes, which is a stage of long duration and constant peak radioresistance in all strains. The results show that only part of the damage is repairable, and the recuperation efficiency is the same for all strains, and therefore is not correlated with radioresistance. The absolute amount that a cell can repair, as estimated by the size of the conditioning dose is strictly proportional to the shoulder width and independent of the extrapolation number and the sensitivity. The time required to reach maximum recovery is strain dependent: 15 min to 1 hr in diploids, 4 hr in tetraploids.
Author (NSA)

N66-33916# California Univ., Berkeley. Lawrence Radiation Lab.
RECOVERY OF YEAST AFTER EXPOSURE TO DENSELY IONIZING RADIATION
J. T. Lyman and R. H. Haynes Sep. 1965 21 p refs Presented at the Work Shop Conf. on Space Radiation Biol., Berkeley, Calif., 7–10 Sep. 1965
(Contract W-7405-ENG-48)
(UCRL-16545; CONF-650924-7) CFSTI: HC $2.00/MF $0.50

A great enhancement of viability was observed if nonnutritive suspensions of diploid yeast, which were irradiated with X-rays or heavy ions (^{4}He, ^{12}C, ^{20}Ne), were stored at 30°C in the dark for 4 or more hours prior to plating. Maximum recovery was usually observed after 24 to 48 hours; the survival curves obtained upon delayed plating were related to those for immediate plating by a constant dose-modifying factor. Several lines of evidence indicate that recovery is based upon enzymic postirradiation processes unrelated to the initial physiochemical reactions associated with absorption of the radiation. The recovery appears to be substantially independent of the precise chemical nature of the radioinduced lesions. Very severe macromolecular damage is likely to be produced by the densely ionizing radiations. The ability of diploid yeast to recover after such irradiation suggests that a bypass rather than a direct repair mechanism may be involved.
Author (NSA)

N66-33917# Medical Research Council, London (England).
A SEARCH FOR THE GENETIC EFFECTS OF HIGH NATURAL RADIOACTIVITY IN SOUTH INDIA
H. Grueneberg, G. S. Bains, R. J. Berry, Linda Riles, C. A. B. Smith et al London, HMSO, 1966 63 p refs *Its* Spec. Rept. Ser. No. 307
HMSO: 11s

The coastal area between Neendakara and Kayankulam, north of Quilon in Kerala, South India, (which is effectively an island) has high natural radioactivity owing to the presence

of monazite sand, which contains thorium. The mean gamma radiation on the strip is about seven-and-a-half times that of the control areas inland. The strip has been inhabited and geographically isolated for a very long period. A search for genetic damage was made in rats (*Rattus rattus* L) inhabiting this area. The material examined included the macerated skeletons and teeth of 438 rats from eight localities on the strip and of 458 rats from eight control localities inland. In addition, data were collected from these animals on fertility and embryonic mortailty. No evidence was found that variance was greater in the irradiated than in the control populations. Possible explanations are discussed. NSA

N66-33924# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.

EVOLUTION OF GLYCEMIA IN THE RAT AFTER GAMMA IRRADIATION [EVOLUTION DE LA GLYCEMIE CHEZ LE RAT APRES IRRADIATION GAMMA]

Georges Marble, Henri Frossard, Lucien Breuil, and Robert Engler Dec. 1965 11 p refs In FRENCH

(CEA-R-2922)

The study of glycemia variations in the rat after irradiation has made it possible to observe not only a premature hyperglycemia but also a belated hypoglycemia whose importance and subsequent evolution seem to depend on the dose given to the animal. Author (NSA)

N66-33948# Commissariat a l'Energie Atomique, Grenoble (France).

STUDY OF THE FIBRINOGEN-FIBRIN TRANSFORMATION KINETICS AND MODIFICATIONS CAUSED TO THIS REACTION BY IRRADIATION (X-RAYS) OF THE FIBRINOGEN SOLUTION [ETUDE DE LA CINETIQUE DE LA TRANSFORMATION FIBRINOGENE-FIBRIN ET MODIFICATIONS APPORTEES DANS CETTE REACTION PAR IRRADIATION (RAYONS X) DE SOLUTION DE FIBRINOGENE]

Daniel Hollard, Michel Suscillon, Genevieve Marcille, Francoise Rambaud, and Marie Baloyan Feb. 1966 10 p refs

(CEA-R-2949)

A spectrophotometric method is presented for studying the transformation of fibrinogen into fibrin. This method has the advantage of presenting immediately in graph form the three phases of this transformation, namely proteolyse or monomerisation, polymerisation, and clot stabilization. Modifications of this transformation due to x-irradiation of fibrinogen solution were studied. Low doses (90,000 R/mm) prevented transverse polymerisation and doses of 180,000 R and more affected the action of thrombin on fibrinogen and did not given an organised clot, but a fragile gel. Author (NSA)

N66-33981*# TRW Systems, Redondo Beach, Calif.

HUMAN TRACKING PERFORMANCE IN UNCOUPLED AND COUPLED TWO-AXIS SYSTEMS

E. P. Todosiev, R. E. Rose, G. A. Bekey, and H. L. Williams Washington, NASA, Aug. 1966 90 p refs

(Contract NAS1-4419)

(NASA-CR-532) CFSTI: HC $5.00/MF $0.75 CSCL 05H

This report presents the results of an experimental and analytical study of human performance in uncoupled and coupled control systems. Human pilot performance in single and two-axis systems was mathematically modeled by linear second-order describing functions. Manual tracking of two-axis systems with cross-coupling was studied experimentally and analytically. A methodology study compared the identification performance of continuous, iterative, and extrapolation model matching techniques. Author

N66-33985# Joint Publications Research Service, Washington, D. C.

PHYSIOLOGICAL METHODS IN COSMONAUTICS

R. M. Bayevskiy 18 Aug. 1966 321 p refs Transl. into ENGLISH of the book "Fiziologicheskiye Metody v Kosmonavtike" Moscow, 1965 p 1-300

(JPRS-37096; TT-66-33525) CFSTI: $7.00

A monograph covering a broad sphere of problems related to the field of obtaining medical-biological information from space flights is presented. A brief historical review of physiological studies in outer space conducted with balloons, aircraft, rockets, artificial earth satellites, and spacecraft is given. The methods and means of space physiology as applicable to a flight experiment, and general aspects of physiological measurements during space flights through the use of physiological measuring-information systems are discussed. Individual physiological techniques (electrocardiography, phonocardiography, seismocardiography, kinetocardiography, arterial oscillography and sphygmography, actography, electromyography, electroencephalography, and other methods) used during flight experiments with animals and cosmonauts are also discussed. In addition, a bibliography of material relating to the subject area is given. L.S.

N66-34013# Brussels Univ. (Belgium).

NEUROPHYSIOLOGIC CORRELATES OF SENSORY PERCEPTION Final Scientific Report, Feb. 1, 1965-Jan. 31, 1966

John E. Desmedt 15 Mar. 1966 14 p refs

(Grant AF-EOAR-65-57)

(AFOSR-66-0929; AD-633967) CFSTI: HC $1.00/MF $0.50

The functional capabilities and mode of operation of several parts of the feedback neural circuits related to acoustic sensory processing were further investigated in several animal species. The neurochemical properties of the efferent cochlear system of the bird have been defined, showing that strychnine and brucine block the efferent neural influence on the inner ear though with modalities different from those in mammals. The efferent inhibition behaves pharmacologically as a post-synaptic inhibition. In monkeys, the organization of corticofugal projections from the temporal areas of the cerebral cortex were investigated in detail with the nauta and other techniques. In related studies, psychophysiological methods were developed to assess the capabilities of monkeys namely in their dealing with complex acoustic stimuli. In the cat, the studies on acoustic system were mainly concerned with the correlation of physiological evidence related to centrifugal pathways of the auditory system with the anatomical studies performed with nauta technique. Another series of experiments were made on human subjects in order to demonstrate objective changes in cerebral electrogenesis related to the performance of decision tasks. Clear-cut modifications of components of the sensory evoked potentials averaged by digital computers were described and used in the analysis of the cerebral mechanisms underlying signal detection. A series of experiments were initiated on the kinetics of transmitter metabolism in nerve endings in human subjects. These experiments are to be continued with the aim of contributing to optimization of long-term motor performance in man under stressful conditions. Author (TAB)

N66-34047# Human Engineering Labs., Aberdeen Proving Ground, Md.

FURTHER STUDIES OF THE RELIABILITY OF TEMPORARY THRESHOLD SHIFT FROM IMPULSE-NOISE EXPOSURE

David C. Hodge and R. Bruce Mc Commons Apr. 1966 46 p refs
(TM-3-66; AD-634456) CFSTI: HC $2.00/MF $0.50

Three studies were conducted to determine the reliability, under various exposure conditions, of temporary threshold shift (TTS) produced by impulse noise. The subjects, who were representative of the army population, were tested at frequencies throughout the range of human hearing. Individual subjects' TTSs were not consistent enough to permit any meaningful generalizations. However, group-mean TTS was a reliable measure of impulse-noise effects for subjects with both normal and subnormal hearing, and throughout the range of audible frequencies. Basing interpretations on these types of data should insure that results from various tests will be comparable. Author (TAB)

N66-34069*# California Univ., Berkeley. Space Sciences Lab.
ON LARGE MODELS OF SYSTEMS
C. West Churchman Jun. 1966 22 p Presented at 2d Stony Brook Conf. on Advances in Computing, N. Y., Jun. 1966 *Its* Internal Working Paper No. 39
(Grant NsG-243-62)
(NASA-CR-77105) CFSTI: HC $1.00/MF $0.50 CSCL 05K

A theoretical discussion is presented of difficulties in attempts to rationalize large social systems, such as governments, industrial firms, universities, or hospitals by search for central quantitative measures of system performance. These measures, or desirable qualities, are then related to the feasible activities of the particular system in order to enhance man's understanding of the system; and the mathematics which relates these activities to the desirable quantities is dubbed an objective function. Objective functions can then be maximized by use of constraint equations. While the problems inherent in rationalizing human systems by large models are many, it is emphasized that we should not abandon efforts in this direction. M.W.R.

N66-34072*# Northrop Space Labs., Hawthorne, Calif.
INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY Progress Report, 1 Apr.-30 Jun. 1966
R. C. Lindberg [1966] 18 p refs
(Contract NASw-812)
(NASA-CR-77100; NSL-64-29-11) CFSTI: HC $1.00/MF $0.50 CSCL 06F

The anatomical structures of the brain of the species Perognathus longimembris were identified. The study was undertaken to provide orientation in the internal structures of the brain and to establish the feasibility of using the species for investigating the neurological basis of entry into and arousal from hibernation. It is concluded that the small size of the animal and its brain dictate the need for the development of special handling techniques and equipment if the species is to be used for neurophysiological research. Pictures of cross sections are included. D.T.

N66-34175# Maryland Univ., College Park. Inst. of Fluid Dynamics and Applied Mathematics.
MIGRATION AND TRAPPING OF EXCITATION QUANTA IN PHOTOSYNTHETIC UNITS
Robert M. Pearlstein (Ph.D. Thesis) Jun. 1966 110 p refs
(Contract Nonr-595(22))
(BN-453; AD-634537) CFSTI: HC $4.00/MF $0.75

The migration and trapping of excitation quanta in photosynthetic units are treated as a problem of the transport of localized excitons through molecular networks. One, two, and three dimensional networks are treated as distinct cases. For the most part, attention is restricted to regular lattices, and all but nearest neighbor interactions are neglected. The latter are characterized by a single rate constant for ordinary molecule and a trapping center, or trap. It is pointed out that results for those finite networks explicitly considered apply also to infinite systems with periodic traps. TAB

N66-34177# General Dynamics Corp., Groton, Conn. Electric Boat Div.
COMPUTER BASED ADAPTIVE TRAINING APPLIED TO SYMBOLIC DISPLAYS
Angelo Mirabello and Jerry C. Lamb Mar. 1966 62 p refs
(Contract N61339-1594)
(NAVTRADEVCEN-1594-1; AD-634338) CFSTI: HC $3.00/MF $0.75

Three experiments were conducted to explore the effects of adaptive vs. nonadaptive training upon performance in a visual target detection task involving symbolic data displays. The results indicated that increasing display complexity during training and requiring subjects to respond actively to the displays were more effective than maintaining a constant level of complexity and requiring only passive viewing of the displays. But there was no evidence to suggest that changing complexity in an adaptive fashion was more effective than changing complexity in an arbitrary stepwise fashion. Additional findings indicated that maintaining subjects at a high nominal error rate during training was not necessarily detrimental to posttraining performance. A high error rate was at least as effective as a low rate, where the high rate was reached by increasing error rate in a stepwise fashion. Author (TAB)

N66-34179# Tracor, Inc., Austin, Tex.
STUDIES OF BINAURAL INTERACTION Summary Report, 1 Apr. 1965-31 Mar. 1966
Bruce H. Deatherage [1966] 127 p refs
(Contract Nonr-4193(00))
(TRACOR-66-311-U; AD-634344) CFSTI: HC $4.00/MF $0.75

Experiments with dimensional models of the cochlea and studies of auditory localization showed that tone bursts and impulsive stimuli (clicks) are processed differently by the auditory system. The purpose of these experiments was to examine this difference as a function of frequency coding in the ear. TAB

N66-34181# Human Engineering Labs., Aberdeen Proving Ground, Md.
NOISE LOCALIZATION AFTER UNILATERAL ATTENUATION
Robert W. Bauer, John L. Matuzsa, Raymond F. Blackmer, and Sam Glucksberg Apr. 1966 18 p refs
(TM-4-66; AD-634457) CFSTI: HC $1.00/MF $0.50

Partial hearing loss was simulated by insertion of V51-R plastic ear plugs. Subjects wore plugs continuously for periods ranging from six hours to three days. Predictable shifts in localization errors were observed when the stimulus was a broadband noise made up of frequencies above 3000 cycles per second. Reorientation in azimuth localization with ear plugs inserted required three days or more unless accelerated by specific training. Author (TAB)

N66-34186*# California Univ., Los Angeles. Brain Research Inst.

HETEROSENSORY AND HETEROCORTICAL ACTIVATION OF THE PURKINJE NEUTRON

C. Batini [1966] 42 p refs

(Grant NsG-237)

(NASA-CR-77244) CFSTI: HC $2.00/MF $0.50 CSCL 06P

Convergence of heterogeneous afferents appearing at the single neuron level in the cerebellar cortex was investigated. Steel microelectrodes were used for recording the unitary potential in the extracellular field of the Purkinje neuron as well as of the granular cell. Response to phasic activation indicated that the three sensor afferent pathways, may converge on the single Purkinje neuron through the polysynaptic intracerebellar circuit activated by the mossy fiber afferents. A second spike response in the Purkinje neuron records and shortly delayed from the mossy fiber's response is attributed to the climbing fiber afferents producing a monosynaptic activation. Paired cortical and peripheral stimuli devliered at varying intervals show that intracerebellar polysynaptic inhibitory system may be activated by more peripheral stimulations. The present work led to the hypothesis that cortical and peripheral cerebellar afferents studied here may feed into precerebellar stations of convergence, which would be the sources of the mossy and climbing fibers. N.E.N.

N66-34209# Swarthmore Coll., Pa. Dept. of Psychology.

EFFECT OF LEARNING ON THE VISUAL PERCEPTION OF DEPTH

Hans Wallach Aug. 1962 35 p refs

(Contract N61339-511)

(NAVTRADEVCEN-511-1; AD-634542) CFSTI: HC $2.00/MF $0.50

An investigation was made to explore the nature of learning, transfer, and forgetting in the visual perception of depth. Numerous preliminary experiments were conducted in order to find a situation in which the occurrence of perceptual learning could be convincingly demonstrated and cogently studied. The experiments that were finally selected for major emphasis dealt with stereoscopic depth perception (retinal disparity), and the kinetic depth effect, i.e., the cues that are due to rotation of a three-dimensional object or the observer's locomotion around the object. TAB

N66-34214# School of Aerospace Medicine, Brooks AFB, Tex.

A METABOLIC ASPECT OF THE EFFECT OF ALTITUDE ON D-AMPHETAMINE IN THE RAT Progress Report (Preliminary), Oct. 1965–Jan. 1966

Albert T. Bernardini Apr. 1966 10 p refs

(SAM-TR-66-42; AD-634054) CFSTI: HC $1.00/MF $0.50

Measurement was made of unchanged d-amphetamine excreted in urine from rats at a simulated altitude of 18,000 feet with 46% environmental oxygen maintained. Findings indicated no significant difference when compared to amphetamine in urine from rats injected with amphetamine at ground level. Author (TAB)

N66-34215# System Development Corp., Santa Monica, Calif.

BINARY PREDICTION BEHAVIOR WHEN THE GENERATING SOURCE RESEMBLES A LANGUAGE

Burton R. Wolin and Rosemarie Weichel 31 Mar. 1966 24 p refs

(SP-1953/001/00; AD-633911) CFSTI: HC $1.00/MF $0.50

Complex learning behavior was investigated in a highly structured binary choice situation. The language-like generating source produced an event sequence which was completely defined by 17 different rules, two of these rules were stochastic. Interest was focused on the learning process and the presence or absence of artificial memory. Results demonstrated the importance of artificial memory, not so much in the kind of learning that occurred but in the rate, amount and completeness of the learning process. Ss who learned one rule well generally learned them all well, including the stochastic rules. There was no evidence that the learning process was strongly influnced by the hierarchical structure of the source, instead, learning was contingent upon the emergent structure of the event sequence. Author (TAB)

N66-34222# School of Aerospace Medicine, Brooks AFB, Tex.

PHYSIOLOGIC CHEMISTRY OF THE HUMAN ORAL SECRETIONS. TOTAL PROTEIN CONTENT OF PAROTID FLUID COLLECTED WITHOUT EXOGENOUS STIMULATION Final Report, Jun. 1964–Jun. 1965

Ira L. Shannon and James M. Terry Mar. 1966 18 p refs

(SAM-TR-66-30; AD-634574) CFSTI: HC $1.00/MF $0.50

Parotid fluid was collected without exogenous stimulation from 508 systemically healthy young adult males. The total protein content of this fluid, along with serum from simultaneous blood collections, was determined and correlations were sought with oral health status. Serum protein was not related to either caries experience or periodontal status. An insignificant relationship was found between serum protein and parotid fluid protein. This was true when parotid fluid protein was expressed in either concentration or secretion rate in micrograms per minute. Parotid fluid protein was not significantly related to wither of the oral health variables. Parotid flow rate was negatively related to parotid fluid protein concentration ($R=-.287$) and positivly related to the secretion rate for this constituent ($R=.674$). Each of these coefficients was different from zero at the .01 level. Author (TAB)

N66-34225# College of Aeronautics, Cranfield (England).

AN ANNOTATED BIBLIOGRAPHY OF PRESENTATION OF INFORMATION IN AIRCRAFT COCKPITS

J. G. Fox, I. Ferguson, and I. D. C. Andrew London, Min. of Aviation, May 1966 80 p refs

(COA-M&P-73; S&T-Memo-3/66; AD-634575) CFSTI: HC $3.00/MF $0.75

Lists references to reports and published papers on all aspects of presenting information to pilots. Abstracts are given of work particularly relevant to cockpit instrument design. Only work reported since 1940 is listed; for earlier work the reader is referred to "A History of Aircraft Cockpit Instrumentation" by Nicklas (1958). References are listed alphabetically by author under six broad headings; general; methodology and criteria; pilot requirements; display presentation; system presentation; and pilot acceptance and training. The possibilities and directions for future research are discussed. Author (TAB)

N66-34229# Army Foreign Science and Technology Center, Washington, D. C.

EFFECT OF HIGH DOSES OF GAMMA RAYS OF Co^{60} ON POTATO STARCH

S. E. Traubenberg, K. A. Korotchenko, and I. N. Putilova Jun. 1966 12 p refs Transl. into ENGLISH from Izv. Vysshikh Ucheb. Zavedenii, Pishchevaya Tekhnol. (Krasnodar), no. 6, 1965 p 24–28
(FSTC-HT-23-106-66; TT-66-61515; AD-634415) CFSTI: HC $1.00/MF $0.50

Experimental data are presented on high dosage irradiation of potato starch using Co^{60}. Doses up to 94 mrad were used and dissociation products were analyzed. Free radicals were found to exist for extended periods in irradiated potato starch. Author (TAB)

N66-34242# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

METABOLIC PHYSIOLOGY OF MICROORGANISMS AND THE EVOLUTION OF FUNCTIONS

V. N. Shaposhnikov 17 Feb. 1966 220 p refs Transl. into ENGLISH of the book "Fiziologiya Obemna Veshchestv Mikroorganizmov v Svyazi s Evolyutsiyey Funktsiy" Moscow, Izd. Akad. Nauk SSR, 1960 163 p
(FTD-TT-65-616; TT-66-61404; AD-633666) CFSTI: HC $6.00/MF $1.25

Contents: Scientific Terminology; Physiological and Biochemical Characteristics of Microorganisms; Carbon Dioxide in Metabolism: (a) Photosynthesis; (b) Heterotrophic Photoassimilation; (c) Autotrophic Chemosynthesis; (d) Heterotrophic Chemoassimilation of Carbon Dixoide; Autotrophic and Heterotrophic Form of Life; Heterotrophic Form of Life; Some Moments in the History of the Development of Fermentation Studies; Homofermentative Lactic Acid Fermentation; Interrelation of Fermentative Processes with Constructive Metabolic Processes; Heterofermentative Lactic Acid Fermentation; Butyric Acid Fermentation; Condensation Reactions in Fermentations; Practical Importance of Di-Phase Metabolism in Microorganisms; Participation of Molecular Oxygen in Metabolism; Biological Oxidation. TAB

N66-34266# Army Medical Research and Nutrition Lab., Denver, Colo. Physiology Div.

HEMODYNAMIC ALTERATIONS IN HUMANS AND ANIMALS DURING CHRONIC HIGH ALTITUDE EXPOSURE

James A. Vogel, James E. Hansen, and John P. Hannon Jun. 1966 14 p refs
(AD-634647) CFSTI: HC $1.00/MF $0.50

It is concluded from these studies that the heart and circulation are capable of meeting the demands of oxygen delivery during heavy work at altitudes up to 14,000 ft. There was no evidence of any deleterious effect on the circulatory system nor of any reduced efficiency in the heart's action. Even though maximum performance is reduced at this elevation, it does not appear that the heart and circulation are responsible. Lastly, it can be recommended that gradual ascent to high elevation will be definitely advantageous from the standpoint of the cardiovascular system since it will significantly reduce the work load imposed upon the heart, particularly during the early stages of acclimatization when other problems such as pulmonary edema and altitude sickness are most apt to be prominent. Author (TAB)

N66-34273# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

TOXIC EFFECT OF HIGH OXYGEN PRESSURES ON THE LIVING ORGANISM. REPORT 3: NATURE OF SPASMODIC GASES IN WARM BLOOD ANIMALS, SUBJECTED TO THE EFFECT OF HIGH OXYGEN PRESSURES

S. I. Prikladovitskiy 17 Feb. 1966 24 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 20, no. 3, 1935 p 507–517
(FTD-TT-65-966/1+2+4; AD-633773) CFSTI: HC $1.00/MF $0.50

A high oxygen partial pressure has various effects on young white mice depending upon their age. The intraperitoneal, subcutaneous and intracapital introduction of wormtree essence in adult white mice causes the appearance of spasma analogous to the ones which are detected during intravenal injection of the preparatus into dogs. The 'threshold' dosage of wormtree amounts for adult white mice is 0.025 g per 100 g of animal weight. Young white mice react to intraperitobal injection of wormtree differently, depending upon age. An intraperitoneal introduction of strychnine solution (1:2000) in white mice causes accidents of typical strychnine pains. Three age brackets for the irritation of the cortex by electrical and chemical irritants can be established in white mice. These results confirm the assumption that spasma, which appear in warm blooded animals under the effect of high partial oxygen pressures, are the result of an irritation in the cerebral cortex. TAB

N66-34283# RAND Corp., Santa Monica, Calif.

STATISTICAL TECHNIQUES FOR DETECTING AND CLASSIFYING NEURONAL INTERACTIONS

Donald H. Perkel Jun. 1966 40 p refs
(Contract AF 49(638)-1700; Proj. RAND)
(RM-4939-PR; AD-633924) CFSTI: HC $2.00/MF $0.50

An examination is made of mathematical techniques for comparing two simultaneously recorded neuronal spike trains and a presentation of a computer simulation using these techniques. Author (TAB)

N66-34295# California Univ., Los Angeles. Western Management Science Inst.

A MODEL OF INFORMATION ACQUISITION AND ORGANIZATION

Earl B. Hunt Mar. 1966 30 p refs *Its* Working Paper No. 97
(Contract Nonr-233(75))
(AD-633562) CFSTI: HC $2.00/MF $0.50

Neurophysiological studies have shown the existence of a variety of feature detectors in sensory branches of the nervous system. Psychopharmacological studies have shown that a variety of stimulants can be used to enhance learning in a way that is best explained by assuming that they act directly upon storage of the memory trace. A model of discrimination is proposed which incorporates the existence of feature detectors and uses them, plus associated postulates, to derive a facilitory effect of stimulant drugs upon memory. The model's implications for more complicated memory situations, such as the problems studied in human verbal learning, are also considered. Author (TAB)

N66-34305# Chicago Univ., Ill.

INVESTIGATIONS IN THE FIELD OF RELATIONAL BIOLOGY Final Report, Oct. 1, 1963–Mar. 31, 1965

Robert Rosen 20 May 1966 6 p refs
(Grant AF-AFOSR-9-64)
(AFOSR-66-0956; AD-634283) CFSTI: HC $1.00/MF $0.50

The studies are concerned with the structure and properties of a class of relational models of simple organisms. Some important problems relating to the behavior of these systems in altering environments are related to the properties of associated sequential machines and thence to control

problems in dynamical systems. Questions of realizability of these abstract systems are considered in some detail, and the formulation of a general optimality principle, which would allow us to relate the abstract model to specific physicochemical realizations (i.e., real organisms) is discussed. Some implications of this study, both for important problems in biology, and for the study of nonbiological (i.e., engineering or extraterrestrial) realizations of biological organizations are described. Author (TAB)

N66-34311*# Goodyear Aerospace Corp., Litchfield Park, Ariz.

THE DYNAMICS OF THE SEMICIRCULAR CANALS

Fernand Belanger and Robert Mayne 22 Nov. 1965 59 p refs (Contract NAS9-4460)

(NASA-CR-65455; GERA-1085) CFSTI: HC $2.50/MF $0.75 CSCL 06B

Investigated is the theoretical response of the semicircular canals. Transfer functions are derived for the response to a steady-state sinusoidal input of displacement, velocity, and acceleration of the head. The response to various forms of transient inputs are then investigated, including sinusoidal, step, pulse, velocity and acceleration of the head. Responses to these various inputs were obtained by computer runs. The curves plotted from these data should simplify greatly computations of responses to the most common inputs of motion used by experimenters. The study of the response to a pulse input of velocity whereby the head is moved from one position to another led to unexpected results. The cupula overshoots the neutral position as the head is stopped, and the integrated velocity signal corresponds theoretically to a return of the head to the original position. The report discusses possible compensatory reactions to offset these erroneous sensory data. Author

N66-34319# Joint Publications Research Service, Washington, D. C.

STUDIES IN PHYSIOLOGICAL REACTIONS OF HUMANS AND ANIMALS TO SPACE FLIGHT

29 Jul. 1966 37 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 3, May–Jun. 1966

(JPRS-36733; TT-66-33164) CFSTI: $2.00

CONTENTS:

1. FUNCTION OF THE HUMAN ACOUSTIC ANALYZER AFTER EXPOSURE TO CORIOLIS ACCELERATIONS OF DIFFERENT VALUES Yu. V. Krylov p 1–5 refs (See N66-34320 20-04)

2. PHYSIOLOGIC REACTIONS OF COSMONAUTS TO THE ACTION OF ACCELERATION DURING THE FLIGHT OF THE SPACESHIP "VOSKHOD" A. R. Kotovskaya, N. Kh. Yeshanov, R. A. Vartbaronov, and S. F. Simpura p 6–21 refs (See N66-34321 20-04)

3. PATHOMORPHOLOGIC CHANGES IN HEMOPOIETIC ORGANS OF MICE EXPOSED TO THE COMBINED EFFECT OF SEVERAL KINDS OF IONIZING RADIATION AND DYNAMIC SPACE FLIGHT FACTORS N. A. Gaydamakin, V. G. Petrukhin, V. V. Antipov, P. P. Saksanov, and V. C. Shashkov p 22–33 refs (See N66-34322 20-04)

N66-34320# Joint Publications Research Service, Washington, D. C.

FUNCTION OF THE HUMAN ACOUSTIC ANALYZER AFTER EXPOSURE TO CORIOLIS ACCELERATIONS OF DIFFERENT VALUES

Yu. V. Krylov *In its* Studies in Physiol. Reactions of Humans and Animals to Space Flight 29 Jul. 1966 p 1–5 refs (See N66-34319 20-04) CFSTI: $2.00

The human physiological response on the vestibular apparatus following Coriolis accelerations was studied for use in the scientific determination of artificial gravity to be created in space vehicles. The reaction of the acoustic analyzer to Coriolis accelerations in a slowly revolving chamber was studied, and masking thresholds determined in order to study the function of hearing. It was concluded: (1) Twenty-four hours' confinement of human beings in a small chamber gives rise to fluctuations in acoustic sensitivity ranging from 10 to 12.5 dB. (2) Twenty-four hours' continuous rotation of human beings in a small chamber at an angular velocity of 5.3 deg/sec has no significant effect on the fluctuations in acoustic sensitivity. (3) Twenty-four hours' continuous rotation of human beings in a small chamber at an angular velocity of 10.6 or 21.2 deg/sec causes changes in acoustic sensitivity of 12.5 to 25 dB. R.LI.

N66-34321# Joint Publications Research Service, Washington, D. C.

PHYSIOLOGIC REACTIONS OF COSMONAUTS TO THE ACTION OF ACCELERATION DURING THE FLIGHT OF THE SPACESHIP "VOSKHOD"

A. R. Kotovskaya, N. Kh. Yeshanov, R. A. Vartbaronov, and S. F. Simpura *In its* Studies in Physiol. Reactions of Humans and Animals to Space Flight 29 Jul. 1966 p 6–21 refs (See N66-34319 20-04) CFSTI: $2.00

The physiological response to acceleration during the Voskhod manned spacecraft flight was investigated. Results obtained indicate that: (1) Cosmonaut physiological reaction during flight to the effects of g strain differed little from that observed in centrifuge rotation. (2) A 24-hour stay of three cosmonauts under conditions of weightlessness did not lead to an essential change in the level of tolerage to g strain arising from the return of the ship to earth. (3) Compared to centrifuge rotations, cosmonaut physiological reactions to g strain effects during descent to earth showed few individual peculiarities. (4) The preliminary preparation of the cosmonauts in the centrifuge was sufficient for satisfactory endurance of g strain under flight conditions. R.LI.

N66-34322# Joint Publications Research Service, Washington, D. C.

PATHOMORPHOLOGIC CHANGES IN HEMOPOIETIC ORGANS OF MICE EXPOSED TO THE COMBINED EFFECT OF SEVERAL KINDS OF IONIZING RADIATION AND DYNAMIC SPACE FLIGHT FACTORS

N. A. Gaydamakin, V. G. Petrukhin, V. V. Antipov, P. P. Saksanov, and V. C. Shashkov *In its* Studies in Physiol. Reactions of Humans and Animals to Space Flight 29 Jul. 1966 p 22–33 refs (See N66-34319 20-04) CFSTI: $2.00

The effects of ionizing radiation combined with vibration and acceleration factors are studied from the pathomorphologic changes seen in the spleen and bone marrow of 245 male mice. Experimental conclusions indicate that: (1) The combined action on mice of ionizing radiation-protons or gamma-rays, with vibration or acceleration, usually changed the degree of expression and character of pathomorphologic changes in the blood-forming organs. (2) The preliminary action of vibration three days and especially one day before radiation increased the destruction of the blood-forming organs. (3) The subsequent action of vibration three or especially five days after radiation markedly increased destructive changes in the blood-forming organs. R.LI.

N66-34342# Rochester Univ., N. Y. School of Medicine and Dentistry.

Fe-59 AND Cr-51 STUDIES OF THE EFFECT OF PARTIAL-BODY X-IRRADIATION ON ERYTHROPOIESIS IN BEAGLES

Vincent Thomas Penikas (Ph.D. Thesis) 1966 256 p refs (Contract AF 33(608)-1272)

(AD-633201) CFSTI: HC $6.00/MF $1.25

In beagle dogs that received partial-body exposures of 1000 KvP X-rays, alternations in erythropoietic activity were studied using Fe-59 as a tracer. Cr-51 was used to estimate erythrocyte life span and the rate of loss on red cells from the circulation following exposure. Three groups of dogs were exposed to 1700 R to the upper-body, one group to 400 R to the upper-body, one group to 400 R to the lower-body, and a sham-irradiated group was used as a control. In an attempt to determine the degree of erythropoietic activity in the irradiated bone marrow during the period of rapid recovery after an upper-body exposure to 1700 R, two groups received an additional exposure of 400 R to either the upper or lower-body 14 days after initial 1700 R exposure. Ferrokinetic data among the various groups were analyzed and compared. TAB

N66-34344# Virginia Univ., Charlottesville. Biochemical Lab.

RED BLOOD CELL PRESERVATION Progress Report, 1 Jul. 1965-30 Jun. 1966

Alfred Chanutin 30 Jun. 1966 64 p refs

(Grant DA-MD-49-193-65-G162)

(AD-633970) CFSTI: HC $3.00/MF $0.75

A number of erythrocyte phosphate metabolites (adenosine tri- and diphosphates, guanosine triphosphate- 2,3-diphosphoglycerate) affected heme-heme interaction and oxygen affinity with hemoglobin which resulted in a shift of the oxyhemoglobin dissociation curve to the right. In addition, tripolyphosphate, and tetra- and hexametaphosphates, particularly the latter, affected the dissociation curve in the same manner. Adenosine monophosphate and ribose-5-phosphate had no effect. These results, which are preliminary, were obtained with hemolysates and purified hemoglobin. Bloods, collected in ACD (pH 5.0) and CPD (pH 5.75) with and without additives, were stored in the cold (4°C) for six weeks. After 0, 2, 4, and 6 weeks storage, the erythrocytes were assayed for DPG, ATP, ADP, AMP, IMP, TPN and GTP by ion exchange chromatography. The ATP of red cells in stored unsupplemented blood was maintained at higher concentrations than those stored in CPD blood; DPG levels were greater in CPD blood. These differences were due to the pH of the blood. The remaining compounds were not appreciably changed during storage. In ACD blood supplemented with small amounts of adenine (0.05 to 0.10 mmole/100 ml), the ATP concentrations were higher than in those which contained greater amounts of adenine (0.5 mmole). The DPG values decreased rapidly in these bloods. Author (TAB)

N66-34424# Lockheed Missiles and Space Co., Palo Alto, Calif.

THE APPLICATION OF HYDROPHILIC AND HYDROPHOBIC SURFACES FOR PHASE SEPARATION IN A LOW-G ENVIRONMENT

J. M. Smith, R. M. Cima, and Yi-Sheng Li *In its* Fluid Mech. and Heat Transfer Under Low Gravity [1965] 20 p (See N66-34408 20-12) CFSTI: HC $7.70/MF $2.25

The separation of liquids and gases under low-g conditions is an important function in many spacecraft systems. In this paper the authors describe the use of hydrophobic (non-wetting) and hydrophilic (wetting) surfaces to control the water and gas phases in certain life-support equipment. The theoretical basis for the phase separation process is described, the principles involved are demonstrated, a humidity-control system embodying these principles is described, and performance test data are presented for this system. Author

N66-34486# Joint Publications Research Service, Washington, D. C.

CYBERNETICS AND AUTOMATION

D. A. Oshanin, ed. 17 Aug. 1966 290 p refs Transl. into ENGLISH of the Book "Sistema Chelovek i Automat" Moscow, Nauka Publishing House, 1965 p 1-252

(JPRS-37072; TT-66-33501) CFSTI: $6.00

Articles on the problems and aims of the study of complex control systems, methods of studying "man and automaton" systems, regularities of human perception and processing of information, and studies of the functional capabilities of human operators are presented. For individual titles see N66-34487-N66-34514.

N66-34487# Joint Publications Research Service, Washington, D. C.

GENERAL PROBLEMS AND AIMS OF THE STUDY OF THE "MAN AND ATUOMATION" SYSTEM

M. G. Gaaze-Rapoport, A. Ya. Lerner, and D. A. Oshanin *In its* Cybernetics and Automation 17 Aug. 1966 p 1-11 (See N66-34486 20-05) CFSTI: $6.00

The continuous growth of mechanization and automation of manufacturing processes is discussed in relation to man's participation in these control systems. The man and automaton system is defined as one in which man makes extensive use of automatic controllers and through working with them performs the control functions. Basic problems are examined which separate the man and automaton system from the general class of cybernetic systems into a relatively independent group. The systems are classified according to their purpose, man's place and role in them, and the character of the information exchange between the man and the automatic device. The problem of optimum distribution of functions within the framework of a single control system is also considered. The necessity for objectively classifying man's functional capabilities under different conditions of his interactions with the machine is stressed, along with the need for studying the specific properties and characteristics of automatic devices. Methodological problems are also discussed, with the establishment of a common language identified as the primary task. M.G.J.

N66-34488# Joint Publications Research Service, Washington, D. C.

ON SOME IDEOLOGICAL ASPECTS OF THE PROBLEM OF THE MAN AND AUTOMATON RELATIONSHIP IN A "MAN AND AUTOMATON" SYSTEM

V. N. Svintsitskiy *In its* Cybernetics and Automation 17 Aug. 1966 p 12-15 refs (See N66-34486 20-05) CFSTI: $6.00

The optimum distributions of the functions of people and automatic devices are discussed in relation to the character of the social order and political ideology of the particular society. Concepts which are said to exist in socialist and capitalist countries are discussed from the viewpoints of humanizing labor, social upheaval, and the degradation of human personality. The ideological aspects are examined, and it is pointed out that a purposeful functioning of complex self-perfecting automatons necessarily presupposes the existence of a link with man's purpose-setting activities. M.G.J.

N66-34489# Joint Publications Research Service, Washington, D. C.

SOME PROBLEMS OF THE STUDY OF COLLECTIVES OF PEOPLE PARTICIPATING IN THE CONTROL OF LARGE SYSTEMS

D. I. Iordanskiy *In its* Cybernetics and Automation 17 Aug. 1966 p 16–25 ref (See N66-34486 20-05) CFSTI: $6.00

Large systems are identified as ones in which people participate, and collective systems are defined as the entire assemblage (set) of people who participate in controlling a given large system. The problems inherent in classifying and studying both systems are considered, and the need for such definitive information in planning and organizing socialist economies is pointed out. A method is proposed in which the collectives are broken into groups and classes. Proceeding from the organizational or administrative structure, it is then possible to study the effect of the collectives of separate sections on the overall indices of an enterprise, and the role of people in large systems in relation to the functions performed by them. Two basic criteria are suggested as guides for more intensive studies: (1) the extent to which the listed and unlisted characteristics of the collectives are reflected in the indices of the functioning of large systems; and (2) the extent to which working conditions and system characteristics satisfy the material and spiritual needs of the collective members. M.G.J.

N66-34493# Joint Publications Research Service, Washington, D. C.

ON THE METHODS OF A PSYCHOLOGICAL STUDY OF THE OPERATOR'S ACTIVITY

Ye. A. Mileryan *In its* Cybernetics and Automation 17 Aug. 1966 p 50–58 refs (See N66-34486 20-05) CFSTI: $6.00

Psychological studies of four basic groups of operators indicate that each profession makes its own specific demands of the man. However, as the professional duties of the operators who control the most dissimilar systems are very similar in their psychological structure, it was possible to determine a structure of activity common for all professions. An experiment was designed which simulated the general structure of the operators' activities with different combinations of the components comprising it. Two series of investigations were conducted to study the process of the development of operating and observation abilities. Details on each are given, and the experimental data are assessed. Findings indicate considerable individual differences in the ability of the subjects to master the operator's profession. M.G.J.

N66-34494# Joint Publications Research Service, Washington, D. C.

ON THE CREATION OF A "MAN AND AUTOMATON" SYSTEM AND ON SOME ASPECTS OF ITS STUDY

V. F. Venda *In its* Cybernetics and Automation 17 Aug. 1966 p 59–67 refs (See N66-34486 20-05) CFSTI: $6.00

An example is given of a direct interaction of man and automaton in which the quality of the man's performance in controlling depends to a decisive degree on how the information received on the operations of the control computers is organized. A method of checking the data represented on the information panel is described, in which the theory of algorithms is used to analyze the mimic flowsheet of a large heating and power station. Details are also given on an experimental system, including a simulator of the boiler–turbogenerator unit. This was developed in connection with an actual problem of designing the operator's station at a large thermal power unit completely automated with the use of a control computer. The importance of the operator's role is stressed in relation to the station design. Factors to be considered are listed as choice of information panel and method of depicting the controlled object; arrangement of signal elements and density of their distribution; color characteristics of the information panel and control desk; type of monitoring and measuring equipment, and the design of its reading parts; and the work room design. M.G.J.

N66-34497# Joint Publications Research Service, Washington, D. C.

ON THE FEASIBILITY OF SOLVING THE PROBLEMS OF THE DIAGNOSTICS OF MAN'S FUNCTIONAL CONDITION WITH THE HELP OF COMPUTERS

R. S. Dadashev and Ye. N. Murashov *In its* Cybernetics and Automation 17 Aug. 1966 p 92–112 refs (See N66-34486 20-05) CFSTI: $6.00

The problem of man and automation is examined with regard to checking the functional condition of man, especially the sick man, as the operator in a complex control system. The approach consists of an examination of methods of statistical processing of physiological parameters and storage of the results in the computer for automatic diagnosing. Values of a physiological parameter were obtained as a random quantity with a normal distribution law. Another approach to the problem is devoted to the probability methods in which the computer itself works out regions of symptom complexes with a small number of experiments, and during the diagnosis compares the current condition with the regions of conditions found automatically. Probability methods are applicable for determining the functional condition when there is no accumulated clinical material. A block diagram of a specialized computer for automatic diagnosis of man's functional condition is included. This automatic diagnosis predetermines the onset of a condition with a certain probability, making it possible to avoid extreme conditions in time. S.P.

N66-34498# Joint Publications Research Service, Washington, D. C.

ON AN INTEGRAL METHOD OF EVALUATING THE DEGREE OF THE OPERATORS' TRAINING IN THE CONTROL SYSTEMS

A. A. Bulat, V. G. Denisov, A. P. Kuz'minov, V. F. Onishchenko, Yu. A. Rozanov et al *In its* Cybernetics and Automation 17 Aug. 1966 p 113–120 refs (See N66-34486 20-05) CFSTI: $6.00

An experiment is reported in which the methods of electrophysiology were used to characterize the skill development process in controlling a spacecraft. These methods were used in objectively considering some reorganization aspects of the operators neuropsychic region on the basis of data from electroencephalograms, electromyograms, electrocardiograms, cutaneogalvanic reactions, and pneumograms. Initial stages in the formation of complex sensomotorial skills in systems control were characterized by a considerable irradiation of the excitation process and asynchronous functioning of various centers of the cerebral cortex and subcortex. This resulted in heightening of the bioelectrical activity of the high frequency rhythms of the cerebral cortex, bioelectrical activity of the muscles, amplitude of the cutaneogalvanic reaction, and heart rate. A diagram of an overall recording of the electro-physiological indices of the operator in the process of training is included. C.T.C.

N66-34499# Joint Publications Research Service, Washington, D. C.

THE RATE OF THE RECEPTION OF INFORMATION BY MAN AND THE CONSCIOUS-VOLUNTARY CONTROL OF HUMAN ACTIVITY

O. A. Konopkin *In its* Cybernetics and Automation 17 Aug. 1966 p 121-129 (See N66-34486 20-05) CFSTI: $6.00

Consideration is given to determining the operator rate of transmitting information from the indicating elements to the control elements in a complex control system. The initial assumptions in studying man as a communication system are connected with the recognition of the amount of the stimulus information determined by the probability relationships in a series of signals. Data were obtained which indicate that the rate of the reception of information by man depends on the conscious-voluntary control by him of his activity. Two groups of experiments are emphasized: the first pertains to a study of the signal presentation rate, and the second is associated with the probability role of the signals. C.T.C.

N66-34500# Joint Publications Research Service, Washington, D. C.

A STUDY OF THE RATE OF INFORMATION PROCESSING BY HUMAN OPERATOR IN SOLVING THE PRACTICAL PROBLEMS OF ENGINEERING DIAGNOSTICS

A. I. Galaktionov *In its* Cybernetics and Automation 17 Aug. 1966 p 130-148 (See N66-34486 20-05) CFSTI: $6.00

An investigation was made of man's information processing rate in connection with a "man-machine" system in order to determine: (1) what portion of the information flow running from the controlled object has to be directed into the automatic device, (2) how many control boards are necessary for each specific production facility, and (3) how to evaluate quantitatively the methods and means of presenting the information. Relative to this an experiment was conducted in which K (number of components of an event) signals were presented simultaneously, one from each component; and the subject's task was to name all of the signals presented. Basic formulations were that each event was identified by several signs, and that each successive sign was dependent on the sign selected at the preceding step of a complex multi-step selection. A distinguishing aspect of the investigation was the approximation of the actual working conditions. C.T.C.

N66-34501# Joint Publications Research Service, Washington, D. C.

THE DEPENDENCE OF THE SELECTION REACTION TIME ON THE AMOUNT OF INDIVIDUAL AND AVERAGE INFORMATION

Ye. P. Krinchik *In its* Cybernetics and Automation 17 Aug. 1966 p 149-155 refs (See N66-34486 20-05) CFSTI: $6.00

A comparative study was conducted on the influence of two information measures, average information and amount of information, on the reaction time of selection by a human operator. Experimental data were obtained in 420 experiments with six subjects being tested, and a total of 240 reactions were measured in each experiment. The results indicate that the two information measures being compared produce an effect which is considerably different both in character and in magnitude. It is shown that the degree of selection complexity exerts a considerably more substantial influence on man's behavior in the situation of selection than the degree of signal unexpectedness. The study also has shown that two interconnected types of uncertainty, time uncertainty and alternative uncertainty, are contained in a situation simulating the process of information transmission, and that man copes with time uncertainty considerably easier than with alternative uncertainty. A.G.O.

N66-34502# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF THE SIGNAL-SIGNIFICANCE FACTOR ON THE COURSE OF PROCESSING THE INFORMATION BY MAN

Ye. P. Krinchik and S. L. Rysakova *In its* Cybernetics and Automation 17 Aug. 1966 p 156-161 refs (See N66-34486 20-05) CFSTI: $6.00

The influence of the degree of signal significance on the processing of information by man in a situation involving selection was studied. Analysis of test results indicated that considerable reduction of time for the reaction to emergency signals in terms of absolute value had taken place. It is noted that this effect is achieved by means of a special readjustment of the perception and reaction to the signals. The subjective attitude of the man toward the signals changes and this creates in him a state of heightened alertness in regard to the especially significant signals. The data obtained show that the introduction of the factor of signal significance leads to an intensification of the information perception process by man, and it is stated that the degree of signal significance may be regarded as one of the important stimuli for raising the rate of information processing by an operator. Test results also showed that a change in both reaction time and rate of information processing is brought about in accordance with the degree of the significance of a signal, which formed in the subject under the effect of one type of reinforcement or another. A.G.O.

N66-34503# Joint Publications Research Service, Washington, D. C.

ON THE ACCURACY OF PSYCHIC REFLECTION OF CHARACTERISTICS, AND ON THE THRESHOLDS OF SENSATIONS AND THRESHOLDS OF PERCEPTION

V. Ya Dymerskiy *In its* Cybernetics and Automation 17 Aug. 1966 p 152-166 (See N66-34486 20-05) CFSTI: $6.00

Sensations and perceptions are examined as two types of a sensory reflection of object characteristics and reality. Sensations are regarded from a quantitative standpoint as psychic measurements, and their accuracy is based on the respective threshold of discrimination. The process of perception represents a psychic calculation of values of a characteristic based on sensations of other characteristics and reflection of functional dependences. An example is proposed to illustrate the accuracy of reflection. Values of the differential threshold of perception are also determined with a concrete example. The psychological data are deemed important for use in engineering psychology, professional training, and simulator development. S.P.

N66-34504# Joint Publications Research Service, Washington, D. C.

A STUDY OF THE PROCESS OF FORMATION OF THE IMAGE OF A BINARY TIME SEQUENCE

A. M. Parachev *In its* Cybernetics and Automation 17 Aug. 1966 p 167-172 refs (See N66-34486 20-05) CFSTI: $6.00

An experiment is described for studying man's behavior in a determinate medium consisting of a sequence of binary symbols (zeroes and ones) written in a random manner and

having a definite length. The test procedure is illustrated and results are enumerated. Heuristic rules used by subjects in solving the problem are discussed. A heuristic automaton which includes units for identification, condensation of information, and operational memory is proposed to assist the stochastic automaton with variable memory. The complex interaction between these two automatons is briefly described. S.P.

N66-34505# Joint Publications Research Service, Washington, D. C.

HICK'S LAW AND THE FACTOR OF THE GENERALIZATION OF PERCEIVED OBJECTS

B. B. Kossov *In its* Cybernetics and Automation 17 Aug. 1966 p 173–177 (See N66-34486 20-05) CFSTI: $6.00

Distinguishibility of stimuli, compatibility of reactions, and perception of structural elements are offered as factors which overshadow the effect of Hick's law pertaining to disjunctive-reaction time. Investigations indicated that the stimuli used to test Hick's law had no such common characteristics that could be used by the subject to generalize. Two hypotheses dealing with the generalization of perceived objects by man are proposed. A series of experiments is described, and it is concluded that disjunctive-reaction time is a finer indicator of generalized associations than the generally accepted criteria of verbal report and reproduction of stimuli. The question of how the forming of generalized associations and distinguishing of an appropriate common characteristics of objects in the perception are correlated is briefly examined. S.P.

N66-34506# Joint Publications Research Service, Washington, D. C.

ON A DIFFERENT CONCEPT OF THE PROCESS OF RECOGNITION

M. S. Shekhter *In its* Cybernetics and Automation 17 Aug. 1966 p 178–182 refs (See N66-34486 20-05) CFSTI: $6.00

An element of signal recognition—the process of comparison—is discussed in terms of its importance in psychological studies of perception. It is stated that many researchers attempt to conceive the mechanisms of recognition without going beyond the limits of the classical, Pavlovian concepts. Their investigations assume that the track from each signal has its own location in the cortex, and when a signal acts on the sense organs, the incoming afferent information reaches that area of the cortex where the track of this signal is located. These assumptions are challenged and the role of the process of comparison in signal recognition is evaluated. H.S.W.

N66-34507# Joint Publications Research Service, Washington, D. C.

UTILIZATION OF THE ATTRIBUTES OF PERCEPTION IN MACHINE IDENTIFICATION

V. A. Makhonin *In its* Cybernetics and Automation 17 Aug. 1966 p 183–185 (See N66-34486 20-05) CFSTI: $6.00

A human like classification of signals is often required in machine identification. An automaton's solution must remain constant with the changes in the description signals. Therefore, it is useful to have the attributes of constancy and integrity of perception in an automaton which performs human like classification. An automaton can be endowed with the property of constancy by providing it with devices for reducing the descriptions to a standard form invariant relative to the group of transformations interlinking the descriptions for one class. Descriptions linked by different groups of transformations may fall into one class according to the type of the objects. A special study showed that with slight limitations on the method of spelling, the written numerals are reduced well by a transformation of the designed group. However, a reduction is useless when it is necessary to deal with a change in the description accompanied by a loss of information due to the limited capabilities of the system of data units and interference effect of extraneous objects. To combat such changes, the automaton must have the property of integrity of perception, especially in identifying volume bodies in the observation from one side. R.N.A.

N66-34508# Joint Publications Research Service, Washington, D. C.

A STUDY OF STATISTICAL CHARACTERISTICS OF HUMAN OPERATOR IN THE CASE OF NON-STEADY-STATE INPUT ACTIONS

G. A. Sergeyev, G. V. Sukhodol'skiy, and V. M. Vodlozerov *In its* Cybernetics and Automation 17 Aug. 1966 p 186–198 refs (See N66-34486 20-05) CFSTI: $6.00

A study of the dependence of the statistical structure of human operator output errors on the characteristics of nonsteady state input actions in a man/automaton system, is reported. To determine the degree of nonlinear transformation of data by a human operator, observations were made of an operator pursuing a moving target. A system containing two control circuits, an exteroceptive circuit and a proprioceptive circuit, were examined as a hypothetical simulator of the human operator's tracking system in the pursuit mode. The characteristics of the correlation functions of the components of the human operator's errors at different stages of training were examined. It is concluded that it is most expedient to use an operator in those structural elements of a man/automaton system that are characterized by a high degree of the nonsteady state properties of the control signals. It was further concluded that if it is necessary to link a human operator with the technical elements of a control system, the dynamic characteristics of these elements must be chosen in order to provide conditions of high stability which consider the possible variability of the frequency of human operator error. S.C.W.

N66-34509# Joint Publications Research Service, Washington, D. C.

THE RESULTS OF A STUDY OF SOME CONDITIONS OF OPERATOR'S PERFORMANCE

L. V. Gavrilov, V. I. Nikolayev, and V. N. Temnov *In its* Cybernetics and Automation 17 Aug. 1966 p 199–216 refs (See N66-34486 20-05) CFSTI: $6.00

The high efficiency required in the operation of a complex man–machine system largely depends on the mutual adaptation of man and machine as elements of a single complex control system. Determining the character of the interaction of the operator and of the elements of the system linked with him is a necessary condition for a rational design of the control systems. The circulation and processing of information are of fundamental importance in the control processes. The character of the operator's interaction as an element of the control system is determined by the functions which the operator performs in circulating and processing the information. Experiments are described which were conducted to determine the main factors affecting the length of time which an operator spends in performing his role as a receiver of information, an information analyzer, and an executor of commands. R.N.A.

N66-34510# Joint Publications Research Service, Washington, D. C.

ON THE STRUCTURE OF A COMMAND SIGNAL AND THE OPERATOR'S PSYCHOPHSIOLOGICAL CAPABILITIES FOR CONTROL UNDER THE CONDITIONS OF OVERLOADS

A. A. Volkov, V. G. Denisov, Yu. I. Kirilenko, V. I. Mankevich, S. G. Mel'nik et al *In its* Cybernetics and Automation 17 Aug. 1966 p 217–231 (See N66-34486 20-05) CFSTI: $6.00

A study was conducted on the structure of a command single and the psychophysiological effect of overload conditions on a human operator's capability for control. The study shows that under overload conditions, an operator can control angular and trajectory motions if he receives a single control command. The structure of the control command must be identical to the formula for controlling an automatic system. Selecting the optimum structure of a control command may be done by methods used for automatic control systems. The quality of controlling an object is greatly affected by its dynamic characteristics, by the preparation and degree of training of the operator, by the effect of the disturbing factors, and by the organization of the operator's work place. Data from the polyeffector method of recording physiological functions, show that an increase in overload on an operator leads to control functions which are performed with a great neuropsychic strain and a decline in work quality. The processes affecting an operator's control of an object can be evaluated by analyzing dynamic parameters of the object's motions, the operator's actions, and his psychophysiological strain. R.N.A.

N66-34511# Joint Publications Research Service, Washington, D. C.

ON THE PROBLEM OF PROFESSIONAL FITNESS AND HANDLING CAPACITY OF THE OPERATORS

K. M. Gurevich and L. M. Edel'man *In its* Cybernetics and Automation 17 Aug. 1966 p 232–236 (See N66-34486 20-05) CFSTI: $6.00

This study examines the professional fitness of personnel handling the control desks of electric power installations in terms of their behavior under emergency conditions. Simulated emergency exercises were conducted to observe and evaluate the ability of operators to eliminate an emergency condition. No connection was found between the success of eliminating an emergency and the length of service or special skills of an operator. The repeatedly observed cases of a loss of composure by workers in which grossly mistaken actions were performed indicate that these workers must have some individual peculiarities which to a certain degree predetermine such behavior. R.N.A.

N66-34512# Joint Publications Research Service, Washington, D. C.

PREDICTION AND PROBABILITY AS AN INDICATOR OF MAN'S OPERATIONAL EFFICIENCY

L. S. Khachatur'yants *In its* Cybernetics and Automation 17 Aug. 1966 p 237–243 (See N66-34486 20-05) CFSTI: $6.00

To investigate the influence of active probability prediction by an operator of a man machine system, a series of experiments were conducted. The basic procedural method of work consisted in studying a human operator's reactions to two different steady state types of activity and in studying the effects of external stimuli on the system. The data obtained from these investigations are summarized and evaluated. H.S.W.

N66-34513# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF OVERLOAD AND HYPODYNAMIA ON THE OPERATOR'S REACTION

L. I. Kakurin, A. R. Kotovskaya, V. K. Filosofov, N. A. Chekhonadskiy, and V. A. Chichkin *In its* Cybernetics and Automation 17 Aug. 1966 p 244–247 refs (See N66-34486 20-05) CFSTI: $6.00

The results of a study of the effect of overload and hypodynamia on an operator's reaction in the processing of single visual signals presented in a random manner are given. The experimental procedure is described and graphs which summarize the data obtained are included. It was found that during the action of an overload, the time for an operator's reaction to a light signal increases. Additionally it was determined that hypodynamia also increased the operator's reaction time. H.S.W.

N66-34514# Joint Publications Research Service, Washington, D. C.

THE EFFECT OF SHORT DURATION WEIGHTLESSNESS AND OF THE COMBINED EFFECT OF WEIGHTLESSNESS, ANGULAR AND CORIOLIS ACCELERATIONS ON SOME WORK FUNCTIONS OF THE OPERATOR

L. A. Kitayev-Smyk and A. T. Zverev *In its* Cybernetics and Automation 17 Aug. 1966 p 248–259 refs (See N66-34486 20-05) CFSTI: $6.00

It has been postulated that by creating an artificial gravity in a spacecraft, man's capacity to endure a weightless environment could be increased. It is further stated that this task could be best realized by creating a rotating spacecraft. However, in a rotating system, man will be experiencing the effects of angular and Coriolis accelerations which may cause undesirable vestibulovegetative and vestibulosomatic reactions. This study was conducted to investigate the combined effects of weightlessness and angular acceleration. The recorded data showed an increase in the latent period before a reaction during weightlessness, and a decrease in this period during overload; however, the subjects stated that during the weightlessness they worked faster and more accurately than during overload. During combined weightlessness and Coriolis acceleration, vestibulovegetative reactions appeared. Additional results from the tests are presented and evaluated. H.S.W.

N66-34530# School of Aerospace Medicine, Brooks AFB, Tex.

PREDICTION OF EYE SAFE SEPARATION DISTANCES Technical Report, Jan.–Feb. 1966

Everett O. Richey Jun. 1966 28 p refs Presented at the AGARD Symp. on Loss of Vision from High Intensity Light, Paris, 16–17 Mar. 1966

(AD-634723) CFSTI: HC $2.00/MF $0.50

A method is given for predicting the distances at which the thermal radiation from nuclear detonations will be hazardous to the unprotected human eye. This method relates calculated retinal exposure to experimentally determined eye effects data. Eye hazards as a function of distance are determined for the unprotected human eye exposed to sea-level, air-burst detonation from 0.01 to 10 kt yield. The pupil diameter of the human eye is taken to be 2.5 mm and 6.0 mm respectively, for day and night conditions and the effective focal length of the eye is taken to be 17 mm. Nuclear detonation characteristics and scaling factors are taken from Glasstone's "The Effects of Nuclear Weapons." The results indicate that the eye hazard is the limiting factor in determining the distance of nearest approach to a nuclear detonation unless eye protection is provided. Eye hazards as a function of distance are also determined for the human eye protected

from daytime detonations by a 2% transmission fixed filter. The results indicate that use of such a filter will provide eye protection at distances where other hazards become limiting factors. Author (TAB)

N66-34590# Army Natick Labs., Mass.
DEVELOPMENT OF NUTRITIONALLY DEFINED METABOLIC DIETS FOR AEROSPACE TRAVEL Final Report, Jan.-Dec. 1964
H. Hollender, H. A. Dymsza, and M. Klicka Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 16 p refs
(AMRL-TR-65-218; AD-635499) CFSTI: HC $1.50/MF $0.50

Data compiled during the development of a nutrient defined diet in various flavors and physical forms are presented. The formulation of a liquid form of this diet including the nutrient composition, emulsion stability, antifoaming agents, flavor selection, and the techniques of packaging are discussed. An assessment of the organoleptic quality of the liquid nutrient defined diet by taste panel experts revealed a rating of 6.0 or above for the vanilla and chocolate flavors using a 9 point hedonic scale. Although slightly acceptable to taste panelists, this diet needs major flavor improvement if it is to be considered for use as the sole nutrient source for humans for prolonged periods of time. At the present time, this nutrient defined formulation is considered the best available liquid diet for sole support of humans in aerospace systems. Author (TAB)

N66-34608*# Melpar, Inc., Falls Church, Va.
HUMAN PERFORMANCE CONTROL MONITORING SYSTEM Final Report, Jan. 1965-Feb. 1966
R. E. Mirabelli et al Mar. 1966 87 p refs
(Contract NASw-1085)
(NASA-CR-77272) CFSTI: HC $3.00/MF $0.75 CSCL 06B

A mathematical model of a performance control and monitoring system, and applications for trainable logic in the areas of computation and controls were developed for possible application in more complicated systems. Computational techniques and performance control systems are described. A computer program simulated a second-order servo controlled by an adaptive logic element trained by monitoring of human performance, and the system behavior was observed through experimentation. The trainable logical network concept was extended into a tool for adaptive decision making. Types of decision processes and their association decision criteria are identified. A mathematical model of the adaptive decision process was developed and evaluated by applying it to a problem of control; the results were encouraging for the sample plant and performance index chosen. R.LI.

N66-34613# Army Chemical Center, Edgewood, Md.
REGULATION OF METABOLISM, IN VIVO
Bertram Sacktor and E. Wormser-Shavit Jun. 1966 11 p refs
(AD-634636) CFSTI: HC $4.00/MF $0.75

The concentrations of 35 critical metabolites, including glycogen, trehalose, components of the glycolytic pathway and citric acid cycle, amino acids, phosphates, and adenine nucleotides in flight muscle of the flowfly, phormia, were measured concurrently after periods of flight ranging from 5 sec to 1 hr. Coincident changes in metabolites concomitant with the 100-fold increase in glycolytic flux attained on initiation of flight provided an unique system to determine the steps that control glycolysis in vivo, in the transition from a tissue at rest to one performing strenuous work. Three sites of regulation: the phosphorylation of fructose-6-phosphate; the cleavage of trehalose; and the phosphorolysis of glycogen were established in this system in vivo. Additional controls at the oxidations of alphaglycerophosphate and of proline are suggested. Author (TAB)

N66-34620# Human Factors Research, Inc., Santa Barbara Calif.
GEOGRAPHIC ORIENTATION IN AIRCRAFT PILOTS: CONTEMPORARY CHARTS AND PILOT PERFORMANCE
William E. Osterhoff and James J. Mc Grath May 1966 49 p refs
(Contract Nonr-4218(00))
(TR-751-6; AD-635384) CFSTI: HC $4.00/MF $0.50

Three different aeronautical charts were evaluated in terms of their relative effectiveness as visual navigation aids. Geographic orientation performances of three groups of pilots were measured under conditions of simulated, VFR, flight. One group used the Sectional Aeronautical Chart. Another used the operational navigation chart (ONC), and a third used the pilotage chart (PC). After a practice sortie, each pilot flew two test sorties over different routes of simulated flight. The poorest performances were achieved with the PC on one route and with the ONC on the other route. Pilots using the Sectional performed as well as or better than those using either the PC or the ONC on both routes. It was concluded that the relative effectiveness of aeronautical charts is specific to the terrain over which the pilots must navigate. The PC was an effective navigation aid when used over terrain having a substantial number of visual landmarks, but was less effective than the other charts when used over terrain having few available landmarks. Author (TAB)

N66-34624# Ash Stevens, Inc., Detroit, Mich.
HIGH-YIELD REACTIONS TO INTRODUCE ALDEHYDE GROUPS INTO PYRIDINE DERIVATIVES Final Comprehensive Report
F. A. Daniher and A. B. Ash May 1966 61 p
(Contract DA-18-035-AMC-374(A))
(AD-635119) CFSTI: HC $1.50/MF $0.75

The mechanism of the deoxygenation of 5-ethyl-2-picoline N-oxide with benzyl sulfonyl chloride was elucidated. Two new methods for the deoxygenation of pyridine N-oxides were discovered. The sulfonyl chloride rearrangement of 2-picolin N-oxides was extended to include sulfonic acid anhydrides and sulfonyl bromides. The selective reduction of cyanopyridines to pyridinecarboxaldehydes with Raney nickel was investigated. The conversion of 2-pyridinemethanols to their oximes via the 2-sulfonate esters was demonstrated. The oxidation of 2-pyridine methanols to the corresponding aldehydes with manganese dioxide gave moderate yields. Oxidation of 2-pyridine methanols with T-butyl hypochloride gave the aldehyde in yields of 45 to 57%. 2-pyridin aldoxime methochloride was prepared from 2-pyridine methanol by a new sequence involving (1) quaternization with methyl iodide, (2) conversion to the 2-chloromethyl analog with thionyl chloride and (3) reaction with hydroxylamine: the overall yield was 56%. The conversion of 4-picoline N-oxide to 4-pyridine aldoxime via anil formation, acid hydrolysis, and oxime formation was successful. Author (TAB)

N66-34636*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
A STATISTICAL ANALYSIS OF ELECTROPHYSIOLOGICAL DATA FROM AUDITORY NERVE FIBERS IN CAT Technical Report No. 451

Peter R. Gray 21 Jun. 1966 102 p refs
(Grant NsG-496; Contract DA-36-039-AMC-03200(E); Grants NSF GK-835; NIH-2-P01-MH-04737-06)
(NASA-CR-77274) CFSTI: HC $4.00/MF $0.75 CSCL 06C

Electrophysiological data from single auditory nerve fibers have been analyzed with the objective of developing a random-process model for the firing patterns of these fibers. This study differs from earlier attempts at modeling these data in that new data-processing methods have been employed in order to more directly test and refine assumptions relating to models. In addition to calculating conventional post stimulus time (PST) and interval histograms, various conditional probabilities associated with the firing patterns have been estimated. These analyses suggest that a fiber recovers from the refractory effects that follow a firing within 20 msec after the firing. The effect of the stimulus on a fiber that has apparently recovered can be studied by estimating the conditional probability of a spike in a particular interval of time, given some minimum time since the last firing. Analysis of these recovered probabilities allows a more direct comparison of some aspects of model and data than is possible with other calculations such as the PST histogram. Results from these and other conditional probability analyses are presented with particular emphasis on data obtained with short acoustic clicks as stimuli. Author

N66-34663*# Oklahoma City Univ., Okla.
[INTERDISCIPLINARY STUDIES OF THE EFFECTS OF THE SPACE ENVIRONMENT ON BIOLOGICAL SYSTEMS] Semiannual Status Report
30 Apr. 1966 54 p refs
(Grant NsG-300-63)
(NASA-CR-77216) CFSTI: HC $3.00/MF $0.50 CSCL 06F

Most parameters employed indicated that rats tend to adapt after 12 weeks of constant exposure to an environment composed essentially of oxygen at 5 psia. It has been shown that the rate of conversion of C^{14}-acetate to $C^{14}O_2$ was slowed but that the steady state rate of total CO_2 expiration was not altered in the experimental animals which were exposed to the high oxygen–low pressure environment for 4 weeks. The metabolic implications of these data are discussed. The amount of ascorbic acid found in the adrenal glands was considerably reduced in animals exposed for 4 weeks to the test environment, and the eyes of animals exposed for 4 weeks to the high oxygen–low pressure environment contained 33% less lipid than the control animals. Author

N66-34664*# Maryland Univ., College Park. Dept. of Botany.
A STUDY OF PHYCOPHYSIOLOGY IN CONTROLLED ENVIRONMENTS Twelfth Semiannual Status Report, 1 Oct. 1965–31 Mar. 1966
Robert W. Krauss 1 Apr. 1966 40 p refs *Its* Tech. Rept.-1012
(Grant NsG-70-60)
(NASA-CR-77217) CFSTI: HC $2.00/MF $0.50 CSCL 06P

The physiology is examined of unicellular algae whose culture characteristics make it possible for them to serve in biological regeneration. During studies on the growth of algae at varying cell concentrations and light intensities, the responses of *Chlorella vannielii* cultures indicated the optimum yield for cell populations is approximately 0.9 gram dry weight/liter/day. Similar studies with the high temperature *Chlorella sorokiniane* show a shift in the yield curve at the high light intensities, which indicates that this species may perform exceptionally at greater light intensities and population densities. Experiments showing the effects of gas mixtures other than those normally encountered on earth on algal growth were performed. A complete elimination of both nitrogen and oxygen by substitution of helium for both of them, and a substitution of nitrogen for oxygen proved to be beneficial. Studies on the adaption and mutation and organic composition of *Chlorella* species are also briefly discussed, and papers on primary cellular aging and sterols of *Chlorella* are included. A.G.O.

N66-34667*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
CONTINUATION OF STUDIES IN STATISTICAL DECISION THEORY IN LARGE SCALE BIOLOGICAL EXPERIMENTS Final Report, 1 May 1965–31 Jul. 1966
Dian R. Hitchcock and Gordon B. Thomas 31 Jul. 1966 65 p refs
(Contract NASw-871)
(NASA-CR-77234; SLS-6309R) CFSTI: HC $3.00/MF $0.75 CSCL 06C

The empirical implications of the viewpoint that living organisms are characterized by some feature equivalent to or implied by the negative entropy assumption is examined. The biological significance of atmospheric compositions and surface atmosphere reactions were studied, with emphasis placed on demonstrating the validity of a characterization of life in terms of its ability to establish and maintain a free energy gradient between itself and some portion of its environment. The Martian analysis atmosphere is analyzed, and the extrapolation of these results to a life detection experiment is considered. The distribution of n-alkanes in materials of biotic, abiotic, and unknown origin was observed to determine whether the order in these distributions could be computed from a digitized gas chromatogram. A class of processes was selected which are described in terms of the information which some subset of the ordinates of the observed chromatogram conveys about the whole chromatogram. Comparative data on the various materials are presented. M.G.J.

N66-34669*# Maryland Univ., College Park.
MICROWAVE MEASUREMENT OF PROTEIN HYDRATION AND OF END GROUP CHARGE ACTIVITY Progress Report, 1 Feb.–31 Jul. 1966
[1966] 25 p refs
(Grant NGR-21-002-040)
(NASA-CR-77238) CFSTI: HC $1.00/MF $0.50 CSCL 06

A research program investigating the dielectric absorption of microwave frequencies for specific neuroproteins is in progress. It is expected that this investigation will yield information on the water of hydration of the macromolecule and on specific end group anisotropic activity which will be of value in both structural and physiological interpretation. The microwave cavity for this dielectric measurement has now been completed and is illustrated. Features of the instrument are discussed. The design and construction of a controlled-environment chamber is reported, with graphic information showing the time-voltage relationships which plateau the chamber to a variety of final temperatures. Author

N66-34687# Royal Aircraft Establishment, Farnborough (England).
COAXIAL MICROELECTRODES FOR INTRACELLULAR PICK-UP OF BIOPOTENTIALS [KOAKSIAL'NYE MIKROELECTRODY DLYA VNUTRIKLETOCHNOGO OTVEDENIYA BIOPOTENTSIALOV]

I. V. Batuyeva Jun. 1966 14 p refs Transl. into ENGLISH from Tsitologiya (Leningrad), v. 6, no. 6, 1964 p 772–774 (RAE-LIB-TRANS-1168) CFSTI: HC $1.00/MF $0.50

The technique of making of coaxial microelectrodes has been described. The tip diameter of the inner barrel is under 1.0, that of the outer one is 1.5–2 mc and the distance between the tips is 1–4 mc. The low coupling resistance of the microelectrodes (100–200 kΩ), their form and mechanical properties make it possible to use them for investigation of cell electrical parameters. Author

N66-34711# New England Deaconess Hospital, Boston, Mass. Cancer Research Inst.

NEW ENGLAND DEACONESS HOSPITAL SUMMARY PROGRESS REPORT, 1 APRIL 1950 THROUGH 30 APRIL 1965, PART III

[1965] 117 p refs

(Contract AT(30-1)-901)

(NYO-901-37) CFSTI: HC $4.00/MF $0.75

Brief summaries are presented of results of radiobiological studies and studies using radioisotopes as tracers in various physiological studies conducted over a 15-year period. A list is included of 403 publications during the period. Separate abstracts were prepared for 7 sections of this report. NSA

N66-34744# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

SNPO AND SNAP BIOLOGICAL STUDIES Summary Technical Report

R. C. Thompson 3 Jan. 1966 17 p

(Contract AT(45-1)-1830)

(BNWL-182) CFSTI: HC $1.00/MF $0.50

Preliminary results are reported from a series of studies related to the biological effects of inhaled or ingested ^{238}Pu SNAP fuel particles. Dogs were exposed to aerosols of ^{59}Fe-labeled ceramic microspheres ranging in diameter from 6.2 to 20μ. Whole-body scanning was used to follow the distribution of inhaled or swallowed particles over a 2 mo. period. Simulated reactor fuel particles, about 1 mm in diameter and consisting of depleted U in a graphite matrix spiked with ^{89}Sr, and ^{90}Sr–^{90}Y, were used to study the effects of dose rates of 13,000 rad/hr at the surface and 4000 rad/hr at a tissue depth of 50 mg/cm^2 on the skin and gastric mucosa of miniature swine and the radiation dose from ingested particles in rats. A single swine was fed massive doses (approximately 1 C) of ^{238}Pu SNAP fuel particles and the α activity of blood, feces, and urine was followed for 14 days before the animal was sacrificed and various tissues were analyzed for ^{238}Pu content. A simulant for gastric juice was prepared for use in studies of the solubility of SNAP fuel element materials. NSA

N66-34752# Staatliche Zentrale fuer Strahlenschutz, Berlin (East Germany).

DETERMINATION OF THORIUM IN URINE [DIE BESTIMMUNG DES THORIUMS IN HARN]

J. Sommer Dec. 1965 23 p refs In GERMAN; ENGLISH summary

(SZS-12(1965))

A fluorometric and a colorimetric method for the determination of thorium are compared. Procedures for both methods are given. The thorium is separated from the urine by an alkaline earth phosphate precipitation and from inorganic materials by a lanthanum fluoride precipitation and a TTA-extraction. After addition of 5, 10, 50, and 100/μg Th yields were 86 and 87%, standard deviations ±7 and ±8%, and detection limits 2.3 and 2.9/μg for the fluorometric and the colorimetric method, respectively. Author (NSA)

N66-34769# Army Foreign Science and Technology Center, Washington, D. C.

CONCERNING SOME ELEMENTS OF CHLORELLA PROTEIN STRUCTURE

N. N. Mel'Teva, L. I. Polotnova, N. I. Tikhomirova, and A. A. Freyman Jun. 1966 9 p refs Transl. into ENGLISH from Izv. VUZov—Pishchevaya Tekhnol. (USSR), no. 6, 1965

(FSTC-HT-23-109-66; AD-634320) CFSTI: HC $1.00/MF $0.50

Treatment of lyophil-dried specimens of chlorella with dichlormethane freed them of the impurities which cause swelling in water solutions. The protein separated from chlorella, regardless of the form of solvent, contains the same N-terminated groups (glutamic acid, methionine and a small quatity of aspartic acid) and C-terminated groups—(tyrosine and arginine). In chlorella, the amount of proteins containing lysine with free amino group is less than the amount of lysine determined after complete hydrolysis of the protein. It is assumed that a portion of the lysine contained in the protein of the chlorella is assimilable. Author (TAB)

N66-34775# Army Natick Labs., Mass. Clothing and Materials Div.

THE MET AND THE CLO. PART I: RESTATEMENT OF THE ORIGINAL DEFINITIONS Technical Report, Nov. 1962–Nov. 1965

David L. Fiske May 1966 16 p refs *Its* Tech. Rept.-66-21-CM

(MR&E-66-2; AD-634271) CFSTI: HC $1.00/MF $0.50

The definitions of the met (50 Kcal/sq. m. hr = 18.5 Btu/sq ft hr) and the clo (5.55 Kcal/sq. m hr deg C = 1.14 Btu/sq. ft hr deg F), as derived from the original paper (1941) by the three physiologists Gagge, Burton, and Bazett, are discussed in terms familiar to heat transfer engineers. The number of the clo required, n, is stated as a function of the temperature, t, (in deg F), by the equation: n = 0.0814 (92-T) −0.792. This gives a value of n of 1.0 at t=70° F. Author (TAB)

N66-34778# Naval School of Aviation Medicine, Pensacola, Fla.

MEASUREMENT OF LEFT CIRCUMFLEX CORONARY FLOW, CARDIAC OUTPUT, AND CENTRAL AORTIC PRESSURE IN THE UNMEDICATED GREYHOUND DOG

Leroy S. Wirthlin and E. Peter Beck 2 May 1966 20 p refs (NAMI-962; AD-634922) CFSTI: HC $1.00/MF $0.50

To study coronary flow dynamics under basal and changing environmental conditions, it was necessary to develop a standard animal preparation in which left circumflex coronary flow, phasic systemic cardiac output, and central aortic pressure could be measured in the awake, unmedicated state. A technique involving the surgical implantation or electromagnetic flow probes and chronic sampling catheters was successfully applied to nine greyhound dogs. Left circumflex coronary artery (LCCA) flow data, cardiac output, and central aortic blood pressure determinations are presented. In addition, coronary sinus blood determinations for five of the animals (together with the flow data) are included. LCCA flow ranged from 57 to 130 ml/min (35 to 57 ml/100 gm left ventricle/min.). Twenty to forty-seven per cent of flow occurred during left ventricular systole. Oxygen usage ranged from 7.6 to

11.9 ml/min (4.8 to 9.8 ml/100 gm left ventricle/min). The LCCA flow patterns and the range of flow values agree closely with those reported previously by Gregg. It was felt that our measurements were made in the resting but not necessarily basal state. Author (TAB)

N66-34795*# Stanford Univ., Calif. Instrumentation Research Lab.

CYTOCHEMICAL STUDIES OF PLANETARY MICROORGANISMS—EXPLORATIONS IN EXOBIOLOGY Status Report, Sep. 1, 1965–Apr. 1, 1966

Joshua Lederberg and Elliott C. Levinthal [1966] 35 p refs

(Grant NsG-81-60)

(NASA-CR-77175; IRL-1050) CFSTI: HC $2.00/MF $0.50 CSCL 06F

Resumes are presented in the following research areas related to planetary microorganisms: multivator, fluorometry, gas chromatography and optical resolution, mass spectrometry, computer managed instrumentation, and ultraviolet microspectrometry. Evaluation of a neon light source for phosphotase is reviewed under the multivator section, and fluorometry projects deal with reagents for fluorometric assays of hydrolytic enzymes and nanosecond flash fluorometry (phosphorometry). Papers prepared on the analysis of natural products by mass spectrometry are listed; and reviews are included of the mass spectral microanalysis of solids, mass spectrometer data presentation, and computer manipulation of chemical hypotheses. M.W.R.

N66-34819# General Dynamics Corp., San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.

CHEMICAL REACTIONS ON CLEAN SURFACES, USING MODULATED ATOMIC BEAM TECHNIQUES Annual Technical Summary Report, Apr. 1, 1965–Mar. 31, 1966

Howard Saltsburg and Joe N. Smith, Jr. 26 Apr. 1966 21 p refs

(Contract AF 49(638)-1559)

(GA-7108; AFOSR-66-1360; AD-635153) CFSTI: HC $1.00/MF $0.50

The design of a molecular beam experiment to study chemical reactions on clean metal surfaces is described. The motivation for the particular approach to the attainment of clean surfaces and surfaces with a controlled concentration of surface adsorbate is discussed. Finally, the results of the first 12 months effort on this program are summarized, and certain experimental problem areas are discussed. Author (TAB)

N66-34862*# General American Transportation Corp., Niles, Ill. MRD Div.

A WASTE MANAGEMENT SUBSYSTEM Final Technical Report

Jerry Rest, Thomas L. Hurley, and Jack D. Zeff Dec. 1963 106 p refs

(Contract NAS1-2193)

(NASA-CR-66124; MR-1210-8090) CFSTI: HC $4.00/MF $0.75 CSCL 06K

This report summarizes the development, evaluation and delivery of a flight prototype waste management subsystem, as part of a life-support system for manned orbiting space stations. The subsystem provides for the collection, processing and storage of the urine and fecal wastes produced by three or four men for a period of at least 60 days without resupply. Feces are collected by pneumatic transfer techniques and then dried for storage in plastic bags. Urine is also collected by pneumatic transfer techniques, and then separated from entrained gas before it is pumped to a bladder-type storage tank. The subsystem contains a vacuum distillation unit for recovering potable water from urine. Thermoelectric techniques are used to pumping latent heat from the condenser to the evaporator. A reliability analysis indicates that dynamic seals, thermoelectric junctions and vacuum disconnects must be designed for in-flight maintenance to achieve a high operational reliability. Tests have shown that the system can store processed fecal matter for at least 75 days; but additional testing is recommended. Author

N66-34868# California Univ., Los Angeles. Dept. of Engineering.

DIGITAL COMPUTER SIMULATION OF A SIMPLIFIED NERVE NET

Shiang Fan Liu May 1966 117 p refs

(Contracts Nonr-233(52); AT(11-1)-GEN-10)

(Rept.-66-30; AD-634289) CFSTI: HC $4.00/MF $0.75

A neural model of a diffuse, randomly connected two-dimensional network based on the anatomical and physiological evidence of coelenterate nerve nets was constructed and simulated on a digital computer. An experimental on-line nerve net simulation system equipped with a CRT display unit and on-line input keyboards was developed, so that the response of the simulated net could be directly observed and human judgment used during the computation. The response of the model to different input-parameters was investigated and the factors which affect the spread of excitation were evaluated. The results of the experiments performed showed that: (1) the proportion of transmissive junctions of the net is the dominant factor in determining the characteristics of the response; (2) the length of the advancing front of the excitation spread is one of the factors which influence the distance of spread; (3) three types of excitation spread following repetitive stimulation exist, namely, spread in decreasing distance increments, spread in equal distance increments, and spread in increasing distance increments. The last type of spread is not very well confirmed due to the small size of the net. Author (TAB)

N66-34869# Naval Radiological Defense Lab., San Francisco, Calif.

SODIUM TRANSPORT IN ULVA

Joseph T. Cummins, John A. Strand, and Burton E. Vaughan 6 May 1966 19 p refs

(USNRDL-TR-1016; AD-634835) CFSTI: HC $1.00/MF $0.50

The transport of sodium through the marine algae Ulva lobata and Ulva expansa has been studied by a tracer analytical method. Sodium was transported across Ulva at a rate of 0.15%/min in the dark; this rate was slowed by ouabain and increased by formaldehyde. Dinitrophenol DCMU, and ammonium ion had no effect on the dark rate. Light caused a transient, rapid light extrusion of sodium from the algae equal to approximately twice the amount of sodium expected during a two minute dark period. All the inhibitors adversely affected the efflux of sodium due to light. Comparison of the ability of choline and sucrose to elute sodium from Ulva showed that a high portion of the sodium can be released, but only by a process similar to ion exchange. Author (TAB)

N66-34874# Naval School of Aviation Medicine, Pensacola, Fla.

SOME SECONDARY DETERMINERS OF PSYCHOLOGICAL STRESS

Patrick M. Curran and Robert J. Wherry, Jr. May 1966 21 p refs
(NAMI-963; AD-635205) CFSTI: HC $3.00/MF $0.50

The study employed a four-choice, color discrimination task and electric shock in a simulated aircraft flight over hostile country to investigate certain secondary determiners of anticipatory physical threat stress which are presumed to be components of the perceived proximity of the unpleasant event. The findings suggest that the three secondary determiners of anticipatory physical threat stress investigated (perceived time since the situation started, perceived time until the event occurs if it occurs, and time elaspsed since the initial warning of the possible event occurrence) are significant components of the perceived proximity of the unpleasant event, and that they interact in a complex manner. Further research is suggested to determine the nature of the interaction of these components over time. A measure was devised which is considered to reflect differences in individual susceptibility to anticipatory physical threat stress.

Author (TAB)

N66-34875# School of Aerospace Medicine, Brooks AFB, Tex.

PAROTID FLUID CORTICOSTEROID RESPONSE IN NORMAL SUBJECTS DURING SINGLE-DOSE DEXAMETHASONE SUPPRESSION TESTS Final Report, Oct. 1965

Ira L. Shannon, Steven C. Beering, and Robert L. Jenson Apr. 1966 11 p refs
(SAM-TR-66-39; AD-635110) CFSTI: HC $1.00/MF $0.50

Serum and parotid 17-OHCS measurements were carried out on 6 healthy young adult males during a control week and during a second week in which single-dose dexamethasone tests were performed. There were no significant differences in steroid means for either fluid during the control week. At 8 hours after dexamethasone dosage the serum steroid mean decreased by 84.6% and the decrease in parotid fluid concentration was 76.6%. The highly significant suppression of the level of 17-OHCS in serum was proportionately reflected in the steroid response in parotid fluid. These fluid might well be substituted for serum determinations and reinforce previous observations from our laboratory in this regard.

Author (TAB)

N66-34883# Naval Medical Research Inst., Bethesda, Md. Naval Medical School.

POLAR MANUAL: ARCTIC AND ANTARCTIC LIVING CONDITIONS, PERSONNEL SELECTION, HYGIENE AND SANITATION, CLOTHING, NUTRITION, SUPPLIES, AND EQUIPMENT, VISUAL DISABILITIES AND COLD INJURIES, FIRST AID, SAFETY, AND SURVIVAL

Earland E. Hedblom 1965 172 p refs 4th edition
(AD-634266) CFSTI: HC $5.00/MF $1.00

Living conditions and the selection of personnel are reviewed, and discussions are given on hygiene and sanitation, clothing, nutrition and cooking, injuries and first aid, safety and survival rules and regulations, and transporation and logistics.

N.E.N.

N66-34907# Naval Oceanographic Office, Washington, D. C.

COMPREHENSIVE INVESTIGATIONS OF LUMINESCENCE IN THE SEA DURING SCIENTIFIC EXPEDITIONS [KOMPLEKSNYYE ISSLEDOVANIYA SVECHENIYA MORYA V NAUCHNOY EKSPEDITSII]

N. I. Tarasov and I. I. Gitel'zon Jul. 1966 9 p refs Transl. into ENGLISH from Bjul. Okeanograficheskoy Komis. AN SSSR (Moscow), no. 8, 1961 p 75–80
(TRANS-255; AD-635461) CFSTI: HC $1.50/MF $0.50

The level and scope of investigation of marine luminescence in the Soviet Union and the United States is compared. The great interest of American oceanographers in the phenomenon and their achievements are underscored. In order to elucidate the complex nature of bioluminescence, the authors urge to intensify investigations and construct charts of the distribution of luminescent organisms in vertical and horizontal directions, of intensity of bioluminescence, its variations in various taxonomic groups at various depth levels, and hydrological seasons, etc.

Author (TAB)

N66-34943# Army Aeromedical Research Unit, Fort Rucker, Ala.

COMMENT ON CORRELATION COEFFICIENT USE

R. A. Avner Jul. 1966 8 p refs
(USAARU-67-1; AD-635375) CFSTI: HC $1.50/MF $0.50

In computing the Pearson *r*, observations are identified on a nominal scale. The values assigned these observations are measured on a ratio or interval scale. Confusion of these two facts has led to the mistaken assumption that the Pearson *r* can measure degree of association between nominally measured variables.

Author (TAB)

N66-34959# Applied Psychological Services, Wayne, Pa.

CONSPICUITY OF FLUORESCENT AND NON-FLUORESCENT STIMULI Final Report, Apr. 1964–Mar. 1966

Arthur I. Siegel, Richard S. Lanternman, John Lazo, Edmund C. Gifford, and Joseph R. Provost (Aerospace Crew Equipment Lab.) Philadelphia, Pa., Naval Air Eng. Center, 1 Jun. 1966 37 p refs
(Contract N156-44911)
(NAEC-ACEL-537; AD-635393) CFSTI: HC $2.00/MF $0.50

Two investigations were performed into the conspicuity of stimuli equated for luminance, but of different purity and of different dominant wave length. In these experiments, subjects performed a simulated flight and responded to the stimuli as the stimuli appeared at various azimuth locations against a simulated sky background. The results supported the contention that purity will affect detection time in the simulated flight situation and that wave length also exerts an important effect.

Author (TAB)

N66-34988# Bio-Dynamics, Inc., Cambridge, Mass.

REVIEW OF COMBINED TRAUMA: RESEARCH, CLINICAL MANAGEMENT AND PLANNING Final Report

Dean W. Williams Jan. 1966 174 p refs
(Contract OCD-OS-63-141)
(AD-632595) CFSTI: HC $5.00/MF $1.00

The review covers the topic of combined trauma–radiation injury plus burns, physical injury, and/or infection. Since this class of casualty is almost exclusively the product of nuclear weapons effects, the emphasis of the review is on principles of clinical management. Major sections of the review are: (1) A casualty model, generated to assess the significance of combined trauma relative to other forms of injury. (2) A review of clinical management principles for care of combined trauma patients. (3) Clinical guides to the care of radiation, burn, and infection casualties. (4) A review of the recent combined trauma research, and (5) A summary of planning measures designed to assist in preparedness for disaster medical care. An extensive bibliography is also included.

Author (TAB)

N66-34999# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

LECTURES ON ELECTRON MICROSCOPY. IV: SPECIMEN PREPARATION—THIN SECTIONING TECHNIQUES

R. W. Horne (Agr. Res. Council, Cambridge, England) 26 Jun. 1965 21 p Lectures held 23–28 Jun. 1965

(ISS-65/26) CFSTI: HC $1.00/MF $0.50

This report deals with the methods for fixing, embedding and sectioning of tissues for the electron microscope. Author

N66-35000# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

LECTURES ON ELECTRON MICROSCOPY. III: SPECIMEN PREPARATION TECHNIQUES—BASIC PRINCIPLES

R. W. Horne (Agr. Res. Council, Cambridge, England) 25 Jun. 1965 30 p Lectures held 23–28 Jun. 1965

(ISS-65/25) CFSTI: HC $2.00/MF $0.50

This report will form the first of three lectures on the basic principles for the preparation of specimens for electron microscopy. Some of the most general techniques are discussed: methods of supporting the object on a type of film; shadow casting; positive staining; thin sections and replicas. Author

N66-35002# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

LECTURES ON ELECTRON MICROSCOPY. VI: THE STRUCTURE OF VIRUSES

R. W. Horne (Agr. Res. Council, Cambridge, England) 28 Jun. 1965 47 p refs Lectures held 23–28 Jun. 1965

(ISS-65-28) CFSTI: HC $2.00/MF $0.50

This lecture, the last of six lectures on electron microscopy, describes some of the recent findings on the structure of animal, plant, and bacteria viruses, in particular the details observed in the electron microscope. Author

N66-35012*# California Univ., Berkeley. Dept. of Nutritional Sciences.

STUDY OF ENVIRONMENTAL EFFECTS ON CELLULAR AUTOXIDATION Final Report, Mar. 1, 1965–Feb. 29, 1966

D. B. Menzel [1966] 82 p refs

(Grant NGR-05-003-090)

(NASA-CR-77392) CFSTI: HC $3.00/MF $0.75 CSCL 06T

Three areas were investigated to test the hypothesis that oxygen toxicity is a result of increased lipid peroxidation: in vivo peroxidation effects on cell membranes were measured using rats exposed to 100% oxygen at 260, 400, 600, and 760 mm Hg; an in vitro method of studying membrane oxidation was developed using isolated rat kidney lysosomes; and a new reaction involving the products of lipid oxidation, malonaldehyde, and other thiobarbituric acid reactive substances was discovered and studied. Rats exposed to 100% oxygen grew less than those exposed to air; they showed changes in their lysosomal enzymes in lung and brain tissue; and liver lysosomes showed latent changes in the lysomal membrane indicating that very subtle effects from oxygen exposure may hitherto have gone unnoticed. The in vitro method was developed using kidney lysosomes, and the effects of salts, pH, and osmolarity of the medium were studied. It was demonstrated that aldehydes produced during lipid oxidation react with proteins and amino acids. Polymerization of ribonuclease results from reaction with aldehydes and the polymers are less enzymatically active than the native enzyme. It was concluded that the validity of the original hypothesis was demonstrated. L.E.W.

N66-35021*# California Univ., Los Angeles. Brain Research Inst.

NEUROPHYSIOLOGICAL AND BEHAVIORAL STUDIES OF CHIMPANZEES Semiannual Report, Jan. 1–Jun. 30, 1966

J. D. French and W. R. Adey 1 Aug. 1966 32 p refs

(Grant NsG-502)

(NASA-CR-77386) CFSTI: HC $2.00/MF $0.50 CSCL 05J

Techniques and instrumentation for application to neurophysiological and behavioral studies of chimpanzees are discussed in detail including basic patterns and their application to space flight. The acquisition and training of chimpanzees is briefly described. Data analysis, including computer analysis of EEG data and combining mathematical analysis of EEG data and impedance data to study learning and behavior in the chimpanzee, is discussed. Developments in bioinstrumentation are outlined, e.g., packaging and miniaturization of a multichannel biotelemetry system and development of DC blood flow transducing devices. Development of bioinstrumentation and feasibility studies that will form the basis of the experiments for Apollo applications are summarized, including details on environment chambers, physiological instrumentation, waste management, and data analysis methods. Results of computer analysis of performance data in the chimpanzee are also presented in tabular form. L.E.W.

N66-35028# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

LECTURES ON ELECTRON MICROSCOPY. V: THE APPLICATION OF NEGATIVE STAINING TO THE STUDY OF BIOLOGICAL STRUCTURE IN THE ELECTRON MICROSCOPE

R. W. Horne (Inst. of Animal Physiol., Cambridge, England) 26 Jun. 1965 44 p refs

(ISS-65/27) CFSTI: HC $2.00/MF $0.50

This report deals with the techniques of negative staining as applied to electron microscopy. Various investigations on the structure of bacteria, cellular fractions, single molecules and groups of them are described. Author

N66-35056# Instituto Nacional de Technologia, Rio de Janeiro (Brazil).

THE EFFECT OF FENTON'S REAGENT ON TRYPSIN AND RIBONUCLEASE Final Report, 1 Jun. 1965–31 May 1966

J. C. Perrone Jun. 1966 38 p refs

(Grant DA-ARO-49-092-65-G82)

(Rept.-2; AD-635207) CFSTI: HC $2.00/MF $0.50

The inactivation of trypsin by Fenton's reagent is very fast during the first few minutes of reaction. In the first three minutes of reaction about 50% of the activity is lost. However, the inactivation after this initial reaction period is much slower. Fractionation of the reaction mixture shows the presence of two main components: a fast fraction with little activity and a slower and more active fraction. Several authors have published experiments showing that partially damaged molecules are formed during the irradiation of proteins. It was possible to demonstrate that this is also true for trypsin treated with Fenton's reagent. Furthermore, trypsin after suffering this double treatment showed marked changes in its enzymatic characteristics. Cu^{++} was found to have a marked influence on the inactivation of ribonuclease by Fenton's reagent. TAB

N66-35061# Armed Forces Radiobiology Research Inst., Bethesda, Md.

ESTIMATION OF PARAMETERS IN MULTIVARIATE EXPERIMENTAL DESIGN AND A HYPOTHETICAL APPLICATION TO ESTIMATING FRACTIONAL DOSE RECOVERY EFFECTS

J. A. Greenwood Feb. 1966 26 p

(AFRRI-TN66-2; AD-635167) CFSTI: HC $1.00/MF $0.50

A statistical technique is explained, derived and illustrated. It is believed that a study of the values of the terms of the assumed mathematical model (or the graphs therefrom) would be of great informational help to the scientist in interpreting his results. Analysis of variance, components of variance analysis, and the estimation technique described herein applied to a properly designed experiment will go far toward extracting all the relevant information from a sample. Estimation formulas for the terms of the assumed mathematical model are derived for two of the most used statistical experimental designs, the factorial and the orthogonal squares. The method is illustrated on a three-variable, hypothetical dose recovery experiment. It is pointed out that the method gives one a handle on measuring quantitatively the separate and joint contributions to the observed effect of variables otherwise hopelessly correlated and overlapping. Author (TAB)

N66-35082# Cincinnati Univ., Ohio.

AN EXPERIMENTAL COMPARISON OF AN INTRINSICALLY PROGRAMMED TEXT AND A NARRATIVE TEXT Final Report, Sep. 1964–Sep. 1965

R. J. Senter, John S. Abma, Kirk A. Johnson, and Ross L. Morgan (AMRL, Wright-Patterson AFB, Ohio) Wright-Patterson AFB, Ohio, AMRL, Mar. 1966 32 p refs

(Contract AF 33(615)-1046)

(AMRL-TR-65-227; AD-635001) CFSTI: HC $2.00/MF $0.50

The study compared three methods of instruction in binary and octal arithmetic, i.e.: (1) Norman Crowder's branched programmed text, The Arithmetic of Computers; (2) another version of this text modified so that subjects could not see the instructional material while answering 'branching' questions; and (3) a narrative text version presenting the same content material. The principal behavioral measure was relative performance on a pre- and post-training criterion test. The results indicated that prohibiting visual contact with instructional material while answering questions significantly increased the number of erroneous alternatives selected by the subjects, but did not significantly alter the amount of learning manifested nor the time necessary to complete training. The programmed instructional methods resulted in significantly greater improvement on the criterion test than was attained by using the narrative text. The time to complete instruction was significantly less with the narrative text version of the material. Although, in general, less informational content was imparted with the narrative text, the study time necessary per unit improvement was significantly less with that version. Records were kept of the number of 'wrong answer' branches taken by the subjects receiving instruction via the branched programs. Only about 6% of the total possible 'wrong' branches were actually taken. This suggests that branched programming may be wasteful by virtue of providing a quantity of material that is never studied.

Author (TAB)

N66-35084# School of Aerospace Medicine, Brooks AFB, Tex.

ISOLATION OF MIMA AND HERELLEA FROM AN EXPERIMENTAL SPACE-FLIGHT DIET Final Report, 25 Jan.–15 Mar. 1965

Joseph T. Cordaro, Roberta J. Ball, and Jerome P. Schmidt Apr. 1966 9 p refs

(SAM-TR-66-38; AD-635377) CFSTI: HC $1.00/MF $0.50

Mima, Herellea, and other gram-negative, nonfermenting bacteria were isolated from samples of an experimental space-flight diet. Identification of these organisms was facilitated by the use of Sellers's differential agar, although the source of these organisms was not determined, it is possible that the utensils used in preparing the diet were contaminated by the food handler. Mima and Herellea could not be recovered from the feces of subjects subsisting on this diet. Author (TAB)

N66-35087# Armed Forces Radiobiology Research Inst., Bethesda, Md.

ERYTHROCYTE STEM CELL KINETICS IN THE POST-RADIATION RAT

S. J. Baum May 1966 23 p refs

(AFRRI-SR66-4; AD-635086) CFSTI: HC $1.00/MF $0.50

In rats exposed to 300 R of 250 KVP X-rays, erythropoiesis as measured by ^{59}Fe uptake diminished greatly for 48 hours followed by a rapid recovery approaching near normal values approximately 6 days after radiation. It has been postulated that the rate of recovery was primarily due to accelerated release of noninjured stem cells. The present experiment was designed to test this hypothesis. The polycythemic rat preparation was used since it permits the experimenter to control the release of erythrocyte stem cells. In polycythemic rats observed for 17 days postradiation (300 R of 250 KVP X-rays), stem cell release diminished to 8% of the control values during the first 24 hours. This was followed by a rapid recovery from the 2nd to the 5th day. A second decrease was noted from the 6th to the 9th day and a third depression from the 9th to the 12th day. Thereafter, the oscillations diminished indicating a possible return toward the preradiation normal state. An attempt was made to correlate these findings with a kinetic model of erythropoiesis. It was suggested that the initial depression in stem cell release might be due to cellular destruction and inhibitions of cellular release mechanisms. The oscillations of the recovery curve were ascribed to possible rate differences in cellular movements from one precursor compartment to the subsequent one, and to competitive simulations for progenitor cells from related cellular systems of the hematopoietic system. Author (TAB)

N66-35088# School of Aerospace Medicine, Brooks AFB, Tex.

THE EFFECT OF A "TUBE-TYPE" DIET AND STRESS-INDUCING CONDITIONS ON TOOTH MOBILITY, MARCH 1964–OCTOBER 1965

Timothy J. O'Leary, Kenneth D. Rudd, Claude L. Nabers, and Arthur J. Stumpf, Jr. May 1966 13 p refs

(SAM-TR-66-43; AD-635113) CFSTI: HC $1.00/MF $0.50

Three studies were conducted to determine tooth mobility changes. The first two studies considered the effect of a tube-type diet, requiring no mastication, on tooth mobility. The third study evaluated the effect of the same diet, but stress-inducing conditions were added. In the first study, 4 of the 5 participants showed no change from pre-experimental levels for mean tooth mobility after 33 days. The 5th participant, after learning of a family emergency, showed a significant ($p < .01$) increase in mean mobility at the second experimental assessment (33d day). Five subjects subsisted on the tube-type diet for 34 days in a second study. There was no significant difference between the means of the pre-experimental and experimental measurements of the subjects. In a third

study, 3 of the subjects displayed evidence of occlusal habits. All 7 subjects were exposed to stress-inducing conditions of confinement and rigid regulation for the first 30 days. There was a significant ($p < .01$) increase in the tooth mobility values for the subjects with occlusal habits. Author (TAB)

N66-35104# Melpar, Inc., Falls Church, Va.
ELECTRONIC SIMULATION OF THE DYNAMICS OF EVOLVING BIOLOGICAL SYSTEMS Final Technical Report
Keith E. Justice, Edward M. Connelly, and Judy M. Gervinski
Wright-Patterson AFB, Ohio, AF Avionics Lab., May 1966 127 p refs
(Contract AF 33(615)-2456)
(AFAL-TR-66-151; AD-635391) CFSTI: HC $4.00/MF $1.00

A bionic investigation and modeling of organic evolution is described. The project was undertaken to provide a deeper understanding of the adaptive processes involved in organic evolution. Of particular interest was a comparison of self-organizing processes in evolutionary systems and analogous processes in trainable logical networks. The biological prototype for the model is the feral house mouse (Mus Musculus) as it exists in semi-isolated populations in the southwestern United States. Special emphasis is given to a balanced lethal genetic system known to exist in the species. Using Monte Carlo techniques, the model simulates, for each individual, such events as the probability of survival, migration, mating, reproduction, mutation, genetic segregation, and natural selection. Implementation of the model on a digital computer is described. Results of experiments performed with the model show that the model behaves in a manner highly analogous to both the biological prototype and to certain aspects of trainable logical networks. Implications and theoretical investigations of the work for future developments in machine intelligence are discussed. Author (TAB)

N66-35112# School of Aerospace Medicine, Brooks AFB, Tex.
BIOCHEMICAL STUDIES ON ACUTE HYDRAZINE TOXICITY IN MICE Final Report, 1 Jul. 1964–30 Jun. 1965
Eugene Roberts and Daisy G. Simonsen Apr. 1966 22 p refs
(Contract AF 41(609)-2614)
(SAM-TR-66-33; AD-635111) CFSTI: HC $1.00/MF $0.50

Two-dimensional paper chromatographic methods were employed to study the changes produced in amino acid distribution in tissues of normal mice, mice treated with hydrazine, and mice pretreated with protective amino acids before injection with hydrazine. The data suggest that the symptoms of acute hydrazine toxicity do not coincide with any major effects on carbohydrate or amino acid metabolism of brain but do occur at a time when significant changes are noted in amino acid distribution in liver. Particular attention was paid to the area of arginine metabolism. Although arginine injection, itself, produced only an increase in ornithine content in the liver, when arginine was followed in 30 minutes by the administration of hydrazine there were marked increases in both ornithine and citrulline levels. In no instance was there any evidence of the accumulation of argininosuccinic acid. The data were tentatively interpreted to indicate that under ordinary conditions the rate-limiting step in the ornithine cycle of liver may be the carbamylation of ornithine, but that in hydrazine-poisoned animals the condensation reaction of citrulline with aspartic acid to give argininosuccinic acid might become rate-limiting. The significance of this finding is under further investigation, as well as the possibility that changes observed in other ninhydrinreactive constituents in the livers of hydrazine-poisoned animals might be secondary to the inhibition of the above reaction. Lipid analyses of livers of control and hydrazine-treated mice showed that no significant abnormalities occurred in the distributions of the individual constituents as a result of hydrazine injection at a time that marked changes in amino acid content were noted. Author (TAB)

N66-35120# Keio Univ., Tokyo (Japan). School of Medicine.
AUTOMATIC RECORDING OF PO_2, PCO_2, pH, Na AND K IN THE BLOOD AND THE BRAIN Final Report, 15 Mar. 1965–14 Mar. 1966
Toyozo Aizawa Jun. 1966 50 p refs
(Contract DA-92-557-FEC-37972)
(J-213-6; AD-634836) CFSTI: HC $2.00/MF $0.50

The effect of intravenous administration of concentrated Na and K solutions, and cardiorespiratory stimulants on cerebral circulation, metabolism and electrical activity were investigated in cats. (1) Effect of concentrated cation solutions: (a) Increased Na^+ in the extracellular fluids of the brain induced the electrical and metabolic activation and increase in cerebral blood flow. Electroencephalogram showed the seizure or low voltage fast activity. Cerebral blood flow increased, brain PO_2 and PCO_2 increased, pH decreased, Na^+ usually increased and when seizure started Na^+ changed to decrease. (b) Intravenous administration of concentrated K solution resulted in the cardiac dysfunction and consequently showed a decrease in cerebral blood flow and metabolism, and electrical depression. After intracisternal administration of concentrated K solution, it appeared to show the metabolic and electrical activation. However, since there is a question about increase in concentration of K+ in the brain surface after intracisternal administration of K. Further investigation with more appropriate method is necessary for obtaining the direct action of K+ on the brain. (2) Effect of intravenous administration of cardiorespiratory stimulants of aminophylline, dimorpholamine, nikethamide, vitacampher and lobeline were investigated. Author (TAB)

N66-35124# Naval Air Development Center, Johnsville, Pa.
CATECHOL AMINE MEASUREMENTS ASSOCIATED WITH AUTONOMIC-LABYRINTHINE RESPONSES IN MAN EXPOSED TO POSITIVE (PLUS Gz) ACCELERATION Final Report
Elihu York, Kenneth R. Brown, and Alan Goldfien 13 Apr. 1966 18 p refs
(NADC-MR-6602; AD-634519) CFSTI: HC $1.00/MF $0.50

Five normal subjects and two labyrinthine-defective subjects were exposed to acceleration profiles consisting of linear, angular and combined (linear plus angular) stress. Catechol amines were measured in plasma and urine for both groups. A demonstrated rise in plasma nor-epinephrine occurred in two of the five normal subjects, both of whom developed motion sickness following a 'combined' acceleration stress. The normal group had measurable plasma epinephrine levels, under most circumstances, whereas the labyrinthine defective group had none. Although there is insufficient data to make a clear-cut separation between different types of acceleration stress in the two groups, and their associated biochemical responses; nevertheless, there is some evidence to suggest that the intact labyrinth is a factor influencing elaboration of catechol amines, which in turn may be implicated in the development of motion sickness.
Author (TAB)

N66-35138# Wissenschaftliche Gesellschaft für Luft- und Raumfahrt, Cologne (West Germany).

REPORT OF THE TECHNICAL COMMITTEE ANTHROPOTECHNIK'S SESSION OF THE 25th OF NOVEMBER IN BERLIN [BERICHT UEBER DIE SITZUNG DES FACHAUSSCHUSSES ANTHROPOTECHNIK AM 25. NOVEMBER 1965 IN BERLIN]

31 Mar. 1966 38 p refs In GERMAN

(DLR-Mitt-66-03) CFSTI: HC $2.00/MF $0.50

Computer analyses of cortex impulse potentials showed that the human mind is not able to comprehend more than 100 information bids per second that reach the central nervous system through the eyes, ears, skin, smell, and taste sensors. Neurophysiological studies found that a spontaneous, frequency-dependent curbing of the neutron action potentials takes place in the cortex response to information impulses. It was concluded that the combined action of neutron potentials and frequency damping constitute an optimization of the sensory information processes. Insufficient optimization of the information processes and additional stress influences the alertness and efficiency of airplane pilots, especially during starting and landing procedures. Transl. by G.G.

N66-35142# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

SOME COMPARATIVE CONSIDERATIONS ON PUBLIC HEALTH ORGANISATION IN ITALY AND IN THE USA AND THE PROBLEM OF SANITARY SCIENTIFIC RESEARCH [CONSIDERAZIONI COMPARATIVE SULLA ORGANIZZAZIONE DELLA SANITA PUBBLICA IN ITALIA E NEGLI STATI UNITI IN CONNESSIONE CON IL PROBLEMA DELLA RICERCA SCIENTIFICA IN CAMPO SANITARIO]

G. Cortellessa 19 Dec. 1965 30 p refs In ITALIAN; ENGLISH summary

(ISS-65/47) CFSTI: HC $2.00/MF $0.50

This report deals with the United States Federal and State Agencies connected with the solution of problems of public health and sanitation. The action of such agencies shall be compared with that of the existing Italian Agencies. It shall be pointed out how these Federal and State Agencies have developed the scientific research in the field of public health and sanitation. Finally some specific problems shall be illustrated and conclusions drawn possibly valid for our country. Author

N66-35164# Joint Publications Research Service, Washington, D. C.

ELECTROPHYSIOLOGICAL INVESTIGATIONS OF THE RETINA

A. L. Byzov 29 Aug. 1966 45 p Transl. into ENGLISH of the book "Elektrofiziologicheskiye Issledovaniya Setchatki" Moscow, "Nauka" Publishing House, 1966 p 5-8, 148-180, 195-196

(JPRS-37309; TT-66-33738) CFSTI: $2.00

Considered are questions associated with the functioning of the retina as a system for processing visual information, and the mechanisms of adaptation in the retina. The question of horizontal interaction at different levels of the retina and its possible role in the processing of visual signals was studied using the relatively simple *Limulus* eye. On the basis of studies of lateral (inhibitory) interaction and horizontal stimuli summation, it was concluded that the features observed in *Limulus* are also common to the retina of vertebrates. Results of experiments on the mechanisms of adaptation in the retina demonstrated the association of the sensitivity of the eye with the change in the electrical potential in the cells of the retina. Experimental observations indicated that these features may also apply to the retina of vertebrates. S.C.W.

N66-35167*# Florida State Univ., Tallahassee. Inst. for Space Biosciences.

COPOLYMERIZATION OF THE LEUCHS ANHYDRIDES OF THE EIGHTEEN AMINO ACIDS COMMON TO PROTEIN

Tadao Hayakawa (Hokkaido Univ.), Charles Ray Windsor, and Sidney W. Fox (Miami Univ., Coral Gables) [1966] 23 p refs Submitted for Publication

(Grant NsG-173-62)

(NASA-CR-77448) CFSTI: HC $1.00/MF $0.50 CSCL 06A

The eighteen amino acids common to protein have been simultaneously condensed through the N-carboxy anhydrides. Nine of these monomers had first to be specially protected by groups which could subsequently be removed in a single operation. The polymer obtained resembles in quantitative composition an average natural protein. The nutritional and other significances of this type of polymer are discussed. Author

N66-35168*# California Univ., Davis.

CHRONIC ACCELERATION STUDIES—PHYSIOLOGICAL RESPONSES TO ARTIFICIAL ALTERATIONS IN WEIGHT

Progress Report

C. F. Kelly, A. H. Smith, E. L. Besch, R. R. Burton, and S. J. Sluka 1 Sep. 1966 25 p refs

(Grant NGR-05-004-008)

(NASA-CR-77449) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Results of investigations regarding the influence of chronic-acceleration on the energy metabolism of chickens and animals, as indicated by the maintenance feed requirement, are reported. Increases in feed intake and decreases in body size have been generally observed in a variety of animals under chronic-acceleration conditions. The greater feed requirements in these hyperdynamic environments are related to the increased work for the performance of various mechanical activities. From the data presented for the chickens, it appears that gravity is responsible for about 12% of their feed intake. If this proportion applies equally to the energy metabolism, a 2 kg homoiotherm would expend about 14 kcal/day. Other aspects of these studies are also discussed. L.S.

N66-35176*# Purdue Univ., Lafayette, Ind. Dept. of Chemistry.

MASS SPECTROMETRIC STUDIES OF PEPTIDES. III. AUTOMATED DETERMINATION OF AMINO ACID SEQUENCES

Martin Senn, R. Venkataraghavan, and F. W. Mc Lafferty [1966] 21 p refs Submitted for Publication

(Grants NGR-15-005-021; NIH GM-12755)

(NASA-CR-77446) CFSTI: HC $1.00/MF $0.50 CSCL 06A

By utilizing the exact mass of the N-terminal group, the amino acid sequence can be determined from a variety of oligopeptides whose components include 14 of the known amino acids. Most derivatives giving suitable sample vapor pressure and thermal stability can be used if a mass measuring accuracy of ±2 mmu is available. All histidine containing peptides run as the methyl esters appear to have a H atom replaced by CH_3. Automatic measurements of the spectral data plus computer calculation and interpretation of this data give promise that this method may find general use in protein research. Author

N66-35179*# California Univ., Los Angeles. Dept. of Surgery/Urology.

EXTRACTION AND BIOASSAY OF RENIN FROM KIDNEYS OF SODIUM-DEPLETED AND SODIUM-LOADED RATS

A. T. K. Cockett, R. S. Moore, M. Kazmin, and A. P. Roberts [1966] 14 p refs Presented at the Am. Urological Assoc. Meeting, Chicago, 29 May–2 Jun. 1966

(Grants NsG-237-62; PHS HE-09834-01)

(NASA-CR-77466) CFSTI: HC $1.00/MF $0.50 CSCL 06C

The concentrations of renin within rat kidney tissue were determined by extracting and bioassaying rat kidney tissue from sacrificed rats from experimental groups given a diet with increasing levels of sodium chloride after a diet deficient only in sodium chloride. In addition, renal tissue levels of renin after Angiotension II administration in the three groups of rats on the variable sodium diet, for 14 or 21 days, were also compared. Results indicate that rats placed on a low sodium diet for 14 or 21 days had higher concentrations of renin than the controls. Another group with a high sodium diet had lower tissue renin levels. The addition of the Angiotensin II for 21 days resulted in higher concentrations of tissue renin. It was suggested that Angiotensin probably has a preferential effect in the kidney producing further renal ischemia. L.S.

N66-35213*# Stanford Univ., Calif.

EFFECTS OF TIME DELAY IN THE VISUAL FEEDBACK LOOP OF A MAN–MACHINE SYSTEM

John Mc Lean Leslie Washington, NASA, Sep. 1966 121 p refs

(Grant NsG-111-61)

(NASA-CR-560) CFSTI: HC $3.00/MF $1.00 CSCL 05H

This thesis was aimed at studying the effects of time delay in the visual feedback loop of a man–machine system. A one-dimensional, step-type input, pursuit tracking experiment was developed to study these effects with transmission-type delays of zero to ten seconds. Thirty-six subjects participated in a series of tests that covered: seven different delays, two different levels of course complexity for each delay, learning, and open-loop conditions. It was found that tracking performance deteriorates non-linearly with increase in delay and that the magnitude of this performance degradation is a function of course complexity. Author

N66-35214*# Baylor Univ., Houston, Tex.

PHYSIOLOGIC OBSERVATIONS ON RACE CAR DRIVERS

Vincent P. Collins Washington, NASA, Sep. 1966 124 p (Grant NsG-730)

(NASA-CR-570) CFSTI: HC $3.00/MF $1.00 CSCL 06S

Physiological and biochemical responses of race car drivers under conditions of nonsimulated stress were studied to determine the influence of environmental stimuli on individual performance. Field observations of four auto races and 29 subjects are reported. Tilt table tests obtained immediately after racing showed the following three patterns: a temporary fall in systolic pressure with a rise in diastolic pressure, a rise in both systolic and diastolic pressures, and a fall in both systolic and diastolic pressures. In-race recording of ECG showed a prompt and marked increase in heart rate coinciding sharply with the beginning and end of a race. Blood chemistry studies indicated that serum glucose may be of greatest important because of the possible influence of hypoglycemia on performance. Blood volume determinations on passive tilting tended to show a decrease due to an apparent decrease in plasma volume. On resuming recumbent position after tilt, blood volume of two subjects showed an increase. Further studies designed to seek a correlation between blood volume and hematocrit changes and the maintenance of diastolic pressure in passive tilting are suggested. S.C.W.

N66-35216*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

THE BIOLOGICAL SIGNIFICANCE OF THE SEARCH FOR EXTRATERRESTRIAL LIFE

Norman H. Horowitz 15 Aug. 1966 15 p Presented at the Am. Astronautical Soc., Anaheim, Calif., 23 May 1966

(Contract NAS7-100)

(NASA-CR-77550; JPL-TR-32-1000) CFSTI: HC $1.00/MF $0.50 CSCL 06C

Chemical structures and mechanisms underlying the genetic properties of living matter are discussed with emphasis focused on the usefulness of the genetic definition of life in biological studies of extraterrestrial forms. On the basis of the genetic code, it is argued that the discovery of any significant change in the genetic codes of terrestrial life forms would constitute sufficient evidence for the separate origin of an extraterrestrial life form. The possibility of silicon-based extraterrestrial life forms is also discussed. It is concluded that because of its inherent chemical instability, silicon is not suited for the construction of the large, complex kinds of molecules that are associated with the living state. It is surmised that the discovery of any kind of life on Mars, even the simplest form, would be of the greatest scientific interest to our understanding of the origin of life. S.C.W.

N66-35243*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Control Lab.

BIOPHYSICAL EVALUATION OF THE HUMAN VESTIBULAR SYSTEM First Semiannual Status Report

J. L. Meiry and L. R. Young Jun. 1966 22 p

(Grant NGR-22-009-156)

(NASA-CR-77477; MU-66-2) CFSTI: HC $1.00/MF $0.50 CSCL 06P

The physical properties of the vestibular system and its fluids are investigated to determine an analytical model of the system. The theoretical response of the semicircular canals to caloric stimulation, angular rotation and linear acceleration is evaluated and compared to existing experimental data. Progress in experimentation with the labyrinthine fluids and in modeling of the semicircular canals is reported. Author

N66-35255# Stanford Research Inst., Menlo Park, Calif.

AN INVESTIGATION OF ACUTE SUBTLE EFFECTS OF MODERATE TO LOW DOSES OF RADIATION ON SYNAPTIC MECHANISMS Final Report, 1 Jan. 1965–31 Jan. 1966

Enrique J. A. Carregal 31 Jan. 1966 24 p refs

(Contract AT(04-3)-115)

(SRIA-115P53-1) CFSTI: HC $2.00/MF $0.50

Cats were either X-irradiated by whole-body exposure or were completely protected by a lead shield two inches thick, except for a hole, 1 cm in dia., directly over the exposed portion of the spinal cord. Dose rates used in the irradiations were in the range 7–350 R per min. On the basis of the results obtained, it was concluded that irradiation, within the dose range of 7 to 22,000 R, does somewhat affect the functions of the different components of the spinal monosynaptic arcs. However, some of the effects, even at the highest doses of radiation used, were so small that it is

questionable whether they have any meaning in the performance capacity of the intact animal. The most significant findings were the changes occurring in the thresholds of both the pre- and postsynaptic elements of the monosynaptic reflex. Author (NSA)

N66-35268# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

STUDIES ON THE RETENTION AND METABOLISM OF INHALED METHYL IODIDE: RETENTION OF METHYL IODIDE

D. J. Morgan and A. Morgan May 1966 28 p refs
(AERE-R-5117) CFSTI: HC $2.00/MF $0.50

Methyl iodide is one of the forms in which radio-iodine may be released in accidents involving fission products. To provide information to assist in the assessment of the radiological hazard resulting from its inhalation, a series of experiments was carried out with volunteer subjects to measure its retention. Values ranging from 53 to 92% were obtained, with a mean value of 72%. The retention is highly dependent upon respiratory rate, low rates being associated with high retention and vice versa. To study the effect of respiratory rate and tidal volume on retention, an additional series of experiments was carried out. These showed that there is negligible absorption of methyl iodide in the respiratory dead space and that at normal breathing rates, absorption from alveolar air is incomplete. An expression is derived which enables the retention to be calculated. Iodine-132 labelled methyl iodide was used in all these experiments, the average radiological dose to the thyroid being about 3 mrem. Author

N66-35274# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

HEALTH PHYSICS AND MEDICAL DIVISION Annual Research Progress Report, Jan.-Dec. 1965

J. E. Johnston, ed. Jun. 1966 48 p refs
(AERE-PR/HPM-9) HMSO: 7s

Various health physics and medical research findings are reported in the areas of aerosols, radiation physics, and body radioactivity measurements. Progress was made in inhalation studies using human subjects, and a program on methyl iodide was completed. A program of field experiments on the deposition of iodine-131 was completed, and an analysis was made of the contributions of various parts of the boundary layer to the resistance to transport of gaseous elemental iodine to grass. In the field of biophysics a series of experiments was initiated to investigate the effect of various radiations on a simple biological system using recently found methods of dosimetry. The efficiency of body radioactivity measurement was greatly increased by using the GASP and other programs. A considerable number of investigations were carried out using subjects who had been accidentally contaminated, as well as subjects who inhaled, ingested, or were injected with radioactivity. C.T.C.

N66-35282# Atomic Energy of Canada, Ltd., Chalk River (Ontario). Nuclear Labs.

TRITIUM HAZARDS

W. R. Bush Jun. 1966 21 p
(AECL-2594) CFSTI: HC $1.00/MF $0.50

The absorption of tritium oxide into the body through the skin and lungs, its excretion in urine, and the administrative controls ("removal, caution, minor and negligible") are described. The concentration of tritium in air, expressed as $(MPC)_a$, and the radiation dose resulting from a number of $(MPC)_a$-hours of exposure are explained. Finally, the methods for protecting against tritium (ventilation, air-supplied masks, and plastic clothing) are discussed. Author

N66-35287# Isituto Superiore de Sanita, Rome (Italy). Laboratori di Fisica.

PROTECTION AGAINST X-RAYS FROM APPARATUS FOR MEDICAL USE [LA PROTEZIONE DALLE RADIAZIONI NEGLI IMPIANTI A RAGGI X PER USO MEDICO]

G. Missoni 20 Apr. 1966 42 p refs In ITALIAN; ENGLISH summary
(ISS-66/16) CFSTI: HC $2.00/MF $0.50

In this report the hazards of the use of X-rays in diagnosis and therapy are reviewed. The organization of protection from a technical and a legal point of view is illustrated and useful recommendations for carrying out the controls are given. Author

N66-35321*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.

AN IMPROVED WATER RECLAMATION SYSTEM UTILIZING A MEMBRANE VAPOR DIFFUSION STILL CONCEPT

W. B. Coe and H. J. Kolnsberg [1966] 114 p refs
(Contract NAS1-5312)
(NASA-CR-66154; SVHSER-4082) CFSTI: HC $3.00/MF $0.75 CSCL 06K

A laboratory model of an improved water reclamation system based upon the membrane diffusion still concept was analyzed, designed, and constructed. Its performance was demonstrated by means of a 116 hour test on a 1/5 scale system. The system achieved predicted processing rate and successfully recovered 98% of the available water. The water reclaimed from urine during the test was of potable quality throughout. A conceptual design to determine prototype weight and thermal losses, based upon the test results achieved in this program, indicates an achievable launch weight per man of less than 7.5 lbs with an expendable weight of .0716 lbs per man day. Factors which influence this performance indicate the potentiality of the system for improvements in performance as the result of further development. In order to obtain a high degree of reliability and further improve the system capability, additional effort is recommended to investigate membranes and membrane properties as applied to the membrane diffusion still concept. Author

IAA ENTRIES

A66-35291 #
PSYCHOPHYSIOLOGICAL ACTIVITY ANALYSIS AS A CRITERION FOR SPECIAL MEDICAL PREPAREDNESS OF THE VOSKHOD-2 SPACESHIP CREW [PSIKHOFIZIOLOGICHESKII ANALIZ DEIATEL'NOSTI KAK KRITERII SPETSIAL'NOI MEDITSINSKOI PODGOTOVLENNOSTI EKIPAZHA KORABLIA "VOSKHOD-2"].
E. A. Karpov.
Kosmicheskie Issledovaniia, vol. 4, May-June 1966, p. 469-481. 12 refs. In Russian.

Analysis of the flight activities of cosmonauts Leonov and Beliaev in an assessment of their medical preparedness for orbital flight. The system used for the selection and medical training of cosmonauts is considered adequate. V. Z.

A66-35292 #
PROBLEM OF THE EMPLOYMENT OF RADIATION-PROTECTIVE PHARMACOCHEMICAL AGENTS IN SPACEFLIGHT CONDITIONS [K VOPROSU OB ISPOL'ZOVANII RADIOZASHCHITNYKH FARMAKOKHIMICHESKIKH SREDSTV V USLOVIIAKH KOSMICHESKIKH POLETOV].
B. I. Davydov, V. V. Antipov, V. A. Kozlov, P. P. Saksonov, and V. S. Shashkov.
Kosmicheskie Issledovaniia, vol. 4, May-June 1966, p. 482-491. 28 refs. In Russian.

Investigation of the effects of cystamine, AET (β-aminoethylisothiuronium bromide hydrobromide), 5-methoxytryptamine, serotonin, strychnine, phenatine, and aminazine on the stability of 850 individual male mice, 10 guinea pigs, and 8 dogs, subjected to centrifugation. The results of tests are given an extensive analysis. Caution is urged in using these preparations, especially cystamine, AET, serotonin, and 5-MOT, for the protection of astronauts. V. Z.

A66-35507 #
AIRCREW RESPONSE TO THE ENVIRONMENT OF LOW-ALTITUDE HIGH-SPEED FLIGHT.
Richard J. Hornick and Norman L. Lefritz (North American Aviation, Inc., Los Angeles Div., Los Angeles, Calif.).
IN: NAECON/66; PROCEEDINGS OF THE ANNUAL NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 18TH, DAYTON, OHIO, MAY 16-18, 1966. TECHNICAL PAPERS. [A66-35501 19-21]
Conference sponsored by the Dayton Section of the Institute of Electrical and Electronics Engineers.
Dayton, Ohio, Institute of Electrical and Electronics Engineers, 1966, p. 81-85. 5 refs.

Study for determining the effects of long-duration vibration of low-altitude high-speed (LAHS) aircraft on pilot performance. An experiment was conducted in which pilots were exposed to 4 hr of continuous vibration; the subjects were ten experienced pilots each of which was exposed to three different intensity levels of LAHS vibration while performing LAHS piloting tasks. The recorded parameters for flight path error, reaction time, vigilance, physiological responses, and biodynamic response are discussed. Performance measures indicate no major decrements for a 1- to 12-cps band at intensities of 0.20 rms g, no decrement as a function of duration to 4 hr, and definite human tolerance to intensities that were once considered "intolerable." D. P. F.

A66-35508 #
DISPLAY OF INFORMATION IN COCKPIT DURING LOW ALTITUDE, HIGH SPEED FLIGHT.
Julian P. Moore (McDonnell Aircraft Corp., St. Louis, Mo.).
IN: NAECON/66; PROCEEDINGS OF THE ANNUAL NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 18TH, DAYTON, OHIO, MAY 16-18, 1966. TECHNICAL PAPERS. [A66-35501 19-21]
Conference sponsored by the Dayton Section of the Institute of Electrical and Electronics Engineers.
Dayton, Ohio, Institute of Electrical and Electronics Engineers, 1966, p. 87-89. 8 refs.

Discussion of cockpit displays associated with low-altitude, high-speed flight with reference to the salient themes of designing equipment with an understanding of what man can do with it, rather than what it can or is supposed to do; and that testing must be placed under rigid experimental controls using "worst case" criteria wherever possible. The "head up" display is considered to be promising as a means of extending operator skill. Another area of interest is the need for improved map display systems. The necessity for lack of ambiguity of displays is emphasized. It is suggested that flight simulators should attempt actually to induce error, so that when confronted with a real emergency, a pilot will know how to react. Another area requiring systematic experimentation is visual, low-altitude, high-speed flight. F. R. L.

A66-35567
INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4).
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D. C., Spartan Books, 1966. 225 p.
$8.75.

CONTENTS:

PREFACE. A. H. Brown and M. Florkin, p. iii, iv.

PHYSIOLOGICAL EFFECTS OF GRAVITATION. O. G. Gazenko and A. A. Giurdzhian (Academy of Sciences, Moscow, USSR), p. 1-21. 58 refs. [See A66-35568 19-04]

ON THE THRESHOLDS OF GRAVITATIONAL FORCE PERCEPTION BY PLANTS. S. A. Gordon and J. Shen-Miller (Argonne National Laboratory, Argonne, Ill.), p. 22-34. 12 refs. [See A66-35569 19-04]

A REVIEW OF EVIDENCE FOR BIOLOGICAL MATERIAL IN METEORITES. Harold C. Urey (California, University, La Jolla, Calif.), p. 35-62. 42 refs. [See A66-35570 19-30]

PARAFFINIC HYDROCARBONS IN THE ORGUEIL, MURRAY, MOKOIA AND OTHER METEORITES. J. Oró, D. W. Nooner, A. Zlatkis (Houston, University, Houston, Tex.), and S. A. Wikström (Baylor University, Houston, Tex.), p. 63-100. 28 refs. [See A66-35571 19-30]

TECHNIQUES OF TELE-ANALYSIS. Wolf Vishniac (Rochester, University, Rochester, N. Y.), p. 101-110. [See A66-35572 19-05]

SIMULATION OF ORGANISMIC MORPHOLOGY AND BEHAVIOR BY SYNTHETIC POLY-α-AMINO ACIDS. Sidney W. Fox, Robert McCauley, David Joseph, Charles Ray Windsor, and Shuhei Yuyama (Miami, University, Coral Gables; Florida State University, Tallahassee, Fla.), p. 111-120. 20 refs. [See A66-35573 19-04]

THE POSSIBILITY OF LIFE IN OUTER SPACE. A. A. Imshenetsky, S. S. Abyzov, G. T. Voronov, A. I. Zhukova, and S. V. Lysenko (Academy of Sciences, Moscow, USSR), p. 121-130. [See A66-35574 19-04]

DIFFERENTIAL SURVIVAL OF BACTERIA UNDER MARTIAN CONDITIONS. Richard S. Young (NASA, Ames Research Center, Calif.), p. 131, 132.

MICROBIAL CONTAMINANTS IN THE INTERIORS OF SPACECRAFT COMPONENTS. John B. Opfell and William Bandaruk (Philco Corp., Newport Beach, Calif.), p. 133-165. 31 refs. [See A66-35575 19-05]

SURVIVAL AND GROWTH OF POTENTIAL MICROBIAL CONTAMINANTS IN SEVERE ENVIRONMENTS. E. J. Hawrylewicz, C. A. Hagen, and R. Ehrlich (Illinois Institute of Technology, Chicago, Ill.), p. 166-175. 5 refs. [See A66-35576 19-04]

SOME DEVELOPMENTS IN STERILIZATION FOR PLANETARY PROBES. Oran W. Nicks and James R. Miles (NASA, Washington, D. C.), p. 176-196. 18 refs. [See A66-35577 19-05]

SPACECRAFT STERILIZATION - IMPLICATIONS AND SUGGESTIONS. R. W. Davies and N. H. Horowitz (California Institute of Technology, Pasadena, Calif.), p. 197-220. 12 refs. [See A66-35578 19-05]

A NOTE ON CHANGES IN ANAPHASE INDUCED BY MECHANICAL VIBRATION. R. Loubiere, P. Grognot, and F. Violette (Ministère de l'Air, Paris, France), p. 221-224.

AUTHOR INDEX, p. 225.

A66-35568
PHYSIOLOGICAL EFFECTS OF GRAVITATION.
O. G. Gazenko and A. A. Giurdzhian (Academy of Sciences, Div. of Physiology, Commission on Study and Use of Space, Moscow, USSR).
(International Space Science Symposium, 6th, Mar del Plata, Argentina, May 11-19, 1965, Paper.)
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 1-21. 58 refs.

A66-35569
ON THE THRESHOLDS OF GRAVITATIONAL FORCE PERCEPTION BY PLANTS.
S. A. Gordon and J. Shen-Miller (Argonne National Laboratory, Div. of Biological and Medical Research, Argonne, Ill.).
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 22-34. 12 refs.
NASA-AEC-supported research.

Changes in growth and development of plants in "weightless" environments is a focus of several biosatellite projects. Implicit in experimental designs is the consideration that the force vectors from vibration and vehicular spin are near or below the thresholds of perception. Thresholds of 10^{-3} g have been assigned based upon results from centrifugal stimulation of organs essentially fixed with respect to earth gravity. A value of 2×10^{-5} g was derived from vibrational (discontinuous) acceleration of a clinostat wire on which seedlings were mounted. We have developed apparatus that will enable the imposition upon seedlings of a continuous centrifugal force of constant sign concomitant with the nullification of the directional component of earth gravity. Recent experiments evaluating the responses of Avena roots and shoots in such apparatus indicate a threshold on the order of 10^{-3}-10^{-2} g. These values are supported by results of experiments where organs were grown on clinostats whose rotational axes were at various tilt angles with respect to earth gravity; this technique enables minute increments of longitudinal gravitational stimulation as a vector function of the tilt angle, concomitant with compensation for earth gravity. We will discuss the possibility that assigned thresholds of micro-g magnitude are derived as a consequence of undefined forces that are artifacts of apparatus function. (Author)

A66-35572
TECHNIQUES OF TELE-ANALYSIS.
Wolf Vishniac (Rochester, University, Dept. of Biology, Rochester, N. Y.).
(International Space Science Symposium, 6th, Mar del Plata, Argentina, May 11-19, 1965, Paper.)
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 101-106; Discussion, N. W. Pirie (Rothamsted Experimental Station, Harpenden, Herts., England), p. 107-110.

A66-35573
SIMULATION OF ORGANISMIC MORPHOLOGY AND BEHAVIOR BY SYNTHETIC POLY-α-AMINO ACIDS.
Sidney W. Fox, Robert McCauley, David Joseph, Charles Ray Windsor, and Shuhei Yuyama (Miami, University, School of Environmental and Planetary Sciences, Institute of Molecular Evolution, Coral Gables; Florida State University, Institute for Space Biosciences, Tallahassee, Fla.).
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 111-120. 20 refs.
Grant No. NsG-689.

Experiments imitating spontaneous geothermal occurrences have yielded most of the amino acids found in protein. All of the amino acids found in protein are simultaneously condensed, by heating in a range of appropriate conditions, to polymers which have many of the properties of proteins. These properties include molecular weights of many thousand, digestibility by proteolytic enzymes, and catalytic activities. One of the other properties is the tendency to form structured units; these units have many of the attributes of biocells. The processes indicated, and others, comprise a conceptual continuum which, according to accumulated information must have occurred under the conditions existing in regions of the primitive earth. (Author)

A66-35574
THE POSSIBILITY OF LIFE IN OUTER SPACE.
A. A. Imshenetsky, S. S. Abyzov, G. T. Voronov, A. I. Zhukova, and S. V. Lysenko (Academy of Sciences, Moscow, USSR).
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
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Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 121-130.

Experiments were carried out dealing with the effect of extreme factors on microorganisms. Methods for microbiological analysis of meteorites were developed. The effect of temperature, from -20 to +150C, on trypsine activity was studied. It was shown that at about -30C a definite intramolecular reorganization occurs in the enzyme, leading to decreased activation energy. Previously reported resistance of microorganisms to high vacuum was confirmed. New species were tested at 10^{-8}-10^{-9}mm Hg. It was shown that very thin metal and metal oxide films, as well as films from some other substances, may fully protect microorganisms from the hazardous effect of UV rays. By using an artificial climate, camera forms of microorganisms were selected which have the highest resistance to the whole complex of Martian climatic factors. Pigmented and spore-forming microorganisms resist UV up to a dose of 4.04×10^{8} ergs/cm^2. There are microorganisms on earth which show some activity in soil at a relative humidity of 0.096-0.196%. Preliminary data permit one to assume the possibility of existence of earthlike forms on Mars. The majority of meteorites are accessible to earth microorganisms. While choosing a meteorite for microbiological analysis it is necessary to consider the soil and climatic factors of the country where the latter has been found. (Author)

A66-35575
MICROBIAL CONTAMINANTS IN THE INTERIORS OF SPACECRAFT COMPONENTS.
John B. Opfell and William Bandaruk (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).
(International Space Science Symposium, 6th, Mar del Plata, Argentina, May 11-19, 1965, Paper.)
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 133-165. 31 refs.

A66-35576
SURVIVAL AND GROWTH OF POTENTIAL MICROBIAL CONTAMINANTS IN SEVERE ENVIRONMENTS.
E. J. Hawrylewicz, C. A. Hagen, and R. Ehrlich (Illinois Institute of Technology, Research Institute, Life Sciences Research Div., Chicago, Ill.).
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 166-175. 5 refs.
Contract No. NASr-22.

Determination of the effects of diurnal temperature cycling and of limiting concentrations of moisture and oxygen on spore germination, vegetative growth, and sporulation of Bacillus cereus and B. subtilis. The results indicated that diurnally temperature-cycled heat-shocked spores of B. cereus in the simulated Martian atmosphere: (1) survived when the moisture concentration was $\leq 4\%$; (2) germinated but became nonviable when the moisture concentration was $> 4 < 8\%$; (3) germinated with subsequent vegetative growth when the moisture content was $\geq 8\%$ and the concentration and partial pressure of oxygen were $\geq 6\%$ and 15 mm, respectively; (4) sporulated when the moisture concentration was $\geq 6\%$ and the partial pressure of oxygen was 15 mm. Similar data for heat-shocked spores of B. subtilis in the simulated Martian atmosphere, diurnally temperature-cycled, indicated that the spores: (1) survived when the moisture concentration was $\geq 6\%$; (2) germinated but became nonviable when the moisture concentration was $> 1 < 4\%$; (3) germinated with subsequent vegetative growth when the moisture concentration was $\geq 8\%$; (4) sporulated when the moisture concentration was $\geq 6\%$ and the partial pressure of oxygen was ≥ 10 mm. Preliminary studies with B. cereus and B. subtilis spores produced in the simulated Martian environment and reintroduced into this environment indicated that vegetative cell growth and sporulation were normal. These data are discussed with regard to the probability of contamination of extraterrestrial bodies. M. F.

A66-35577
SOME DEVELOPMENTS IN STERILIZATION FOR PLANETARY PROBES.
Oran W. Nicks and James R. Miles (NASA, Office of Space Science and Applications, Washington, D.C.).
(International Space Science Symposium, 6th, Mar del Plata, Argentina, May 11-19, 1965, Paper.)
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
Symposium sponsored by COSPAR, the International Union of Biochemistry, the International Union of Biological Sciences, and the International Union of Physiological Sciences.
Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 176-196. 18 refs.

A66-35578
SPACECRAFT STERILIZATION - IMPLICATIONS AND SUGGESTIONS.
R. W. Davies (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and N. H. Horowitz (California Institute of Technology, Div. of Biology, Pasadena, Calif.).
IN: INTERNATIONAL SPACE SCIENCE SYMPOSIUM, 6TH, MAR DEL PLATA, ARGENTINA, MAY 11-19, 1965, PAPERS. (LIFE SCIENCES AND SPACE RESEARCH. VOLUME 4). [A66-35567 19-04]
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Edited by A. H. Brown and M. Florkin.
Washington, D.C., Spartan Books, 1966, p. 197-220. 12 refs.

Examination of the full implications of spacecraft sterilization and of the different possibilities of interpreting the policy prior to changing current sterilization policies. Current spacecraft sterility requirements are rigorous when compared to previous sterilization standards. Heat soaking of spacecraft enjoys the greatest confidence as a technique for achieving these standards. Alternative strategies which depend on a more careful analysis of the location and nature of microorganisms are considered. It is noted that most, if not all, of the organisms introduced during assembly could be made nonviable with gaseous sterilization. Modules of the spacecraft could then be given different temperature cycles according to how chemically rate-sensitive they are between 100 and 135°C, provided not all components had to meet the same type approval standard. Another possibility would be to add electrolytes, propellants, other heat-sensitive solutions, and instruments after the main spacecraft body has been heat-sterilized. This could then be followed by gaseous sterilization. M. F.

A66-35694
EAR TRANSCEIVER.
L. F. Lyons and D. Valiquette (Spacelabs, Inc., Van Nuys, Calif.).
IN: NTC/66; PROCEEDINGS OF THE 1966 NATIONAL TELEMETERING CONFERENCE, BOSTON, MASS., MAY 10-12, 1966.
[A66-35661 19-07]
Conference sponsored by the Institute of Electrical and Electronics Engineers, the Instrument Society of America, and the American Institute of Aeronautics and Astronautics.
Bedford, Mass., Raytheon Co., 1966, p. 230-234. 14 refs.

Description of the transceiver subsystem of a two-way voice communication system. The complete voice communication system would consist of the transceiver mounted on and within the ear, and a master station. The ear transceiver senses speech sounds in the ear canal with an acoustic transducer, then modulates and transmits an rf carrier to a master station. The master station transmits speech via another rf carrier to the ear transceiver where it is detected and converted to audio with the same acoustic transducer. This technique permits simultaneous two-way hands-off communication via the ear. The concepts, implementation, and potential applications of such a device are discussed, together with prototype test results. M. F.

A66-35703
REAL-TIME BIOMEDICAL DATA CONVERTER.
I. M. Starr and N. Rasmussen (Bendix Corp., Bendix-Pacific Div., North Hollywood, Calif.).
IN: NTC/66; PROCEEDINGS OF THE 1966 NATIONAL TELEMETERING CONFERENCE, BOSTON, MASS., MAY 10-12, 1966.
[A66-35661 19-07]
Conference sponsored by the Institute of Electrical and Electronics Engineers, the Instrument Society of America, and the American Institute of Aeronautics and Astronautics.
Bedford, Mass., Raytheon Co., 1966, p. 295-298.

Specifically designed for use on the Gemini space program an intervalometer-type cardio and respiration rate monitor is being used to extract biomedical rates from decommutated PCM telemetry signals, presenting the biomedical data in real time in analog format. The behavior of the biomedical monitor is graphically illustrated with oscillograms obtained by playing magnetic tape recordings of Mercury and Gemini telemetry signals into the monitor. The oscillograms show the input and output signals under various telemetry and signal conditions experienced during actual flight

missions. Telemetry assignments for aeromedical data are briefly discussed. Use of an active nonlinear filter as a means of signal processing is discussed along with the basic block diagram theory of operation. Although the discussion is oriented toward EKG monitoring, significant differences between the respiratory and EKG processing are considered. (Author)

A66-35711 #
ON THE DISTRIBUTION OF A PERMEABLE SOLUTE DURING POISEUILLE FLOW IN CAPILLARY TUBES.
F. Pollock and J. J. Blum (Columbia University, Hudson Laboratories, Dobbs Ferry, N.Y.; Stevens Institute of Technology, Dept. of Physics, Hoboken, N.J.; Duke University, Dept. of Physiology and Pharmacology, Durham, N.C.).
Biophysical Journal, vol. 6, no. 1, 1966, p. 19-28. 10 refs.
Contract No. Nonr-266(84); Grant No. NGR-34-001-005.

Equations are derived describing the dispersion of a permeable solute during Poiseuille flow in a capillary model. It is shown that for the normal range of physiological parameters such as capillary radius, capillary length, blood flow, permeability coefficients, and diffusion constants, the center of mass of a bolus of solute moves at a speed very close to the mean speed of flow and that the solute leaves the capillary with an exponential time course depending on the permeability but not on the diffusion constant. There is no appreciable difference in the dispersion of the solute or in its rate of permeation from the capillary whether one considers piston flow or Poiseuille flow. A bolus of arbitrary radial shape tends to become radially uniform very close to the arterial end of the capillary. (Author)

A66-35794
ORIGINS OF PHOTOSYNTHESIS.
Patrick Echlin (Cambridge, University, Botany School, Cambridge, England).
Science Journal, vol. 2, Apr. 1966, p. 42-47.

Consideration of the fossils, about 2 billion years old and related to blue-green algae, found on the northern shore of Lake Superior. The implications that these organisms have for the evolution of the photosynthetic process are discussed. R.A.F.

A66-35837
FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; AMERICAN SOCIETY FOR TESTING AND MATERIALS, PACIFIC AREA NATIONAL MEETING, 5TH, SYMPOSIUM ON MAN RATING OF SPACE SIMULATION CHAMBERS, SEATTLE, WASH., OCTOBER 31-NOVEMBER 5, 1965, PAPERS.
Symposium sponsored by NASA and the American Society for Testing and Materials, Committee E-21 on Space Simulation.
Philadelphia, American Society for Testing and Materials (ASTM Special Technical Publication No. 398), 1966. 91 p.
Members, $5.60; nonmembers, $8.00.

CONTENTS:

A66-35838
FUNCTIONAL MAN IN SIMULATED SPACE.
A. F. Sullivan (Litton Industries, Inc., Space Sciences Laboratories, Beverly Hills, Calif.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; AMERICAN SOCIETY FOR TESTING AND MATERIALS, PACIFIC AREA NATIONAL MEETING, 5TH, SYMPOSIUM ON MAN RATING OF SPACE SIMULATION CHAMBERS, SEATTLE, WASH., OCTOBER 31-NOVEMBER 5, 1965, PAPERS. [A66-35837 19-05]
Symposium sponsored by NASA and the American Society for Testing and Materials, Committee E-21 on Space Simulation.
Philadelphia, American Society for Testing and Materials (ASTM Special Technical Publication No. 398), 1966, p. 1-10.

To date, manned operations in space chambers have been restricted to mission testing, and man's unique capabilities have not been usefully employed. Man has not functioned as an in situ experimenter or operator because of the well-recognized physiological restrictions imposed by the available space suits. The early "hard-suit" applied the principle of constant volume to obtain mobility in a pressurized joint. This principle has been further refined and embodied in a space suit developed for NASA. With reduced bulk and weight, and mobility approaching that of an unsuited man, this most recent suit permits immediate consideration of useful manned operations. With further development in the direction indicated by this approach, such operations can reasonably be expected to become routine. (Author)

A66-35839
PHYSIOLOGICAL RESPONSES TO NEAR-VACUUM.
R. W. Bancroft (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Applied Physiology Branch, Brooks AFB, Tex.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; AMERICAN SOCIETY FOR TESTING AND MATERIALS, PACIFIC AREA NATIONAL MEETING, 5TH, SYMPOSIUM ON MAN RATING OF SPACE SIMULATION CHAMBERS, SEATTLE, WASH., OCTOBER 31-NOVEMBER 5, 1965, PAPERS. [A66-35837 19-05]
Symposium sponsored by NASA and the American Society for Testing and Materials, Committee E-21 on Space Simulation.
Philadelphia, American Society for Testing and Materials (ASTM Special Technical Publication No. 398), 1966, p. 11-20. 16 refs.

Evaluation of the effects of rapid decompression on dogs and subhuman primates. Exposure times at the low pressure ranged from 5 to 180 sec for the dogs and up to 150 sec for the chimpanzees. General physical and physiologic responses after loss of consciousness, and the effects of recompression are described. Pathologic effects and mortality incidence resulting from decompression are discussed. B.B.

A66-35840
INSTRUMENTATION AND DATA ACQUISITION FOR PRESSURE-SUITED TEST SUBJECTS IN SPACE ENVIRONMENT SIMULATION TESTING.
E. C. Wortz (Garrett Corp., AiResearch Manufacturing Co., Life Sciences Dept., Los Angeles, Calif.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; AMERICAN SOCIETY FOR TESTING AND MATERIALS, PACIFIC AREA NATIONAL MEETING, 5TH, SYMPOSIUM ON MAN RATING OF SPACE SIMULATION CHAMBERS, SEATTLE, WASH., OCTOBER 31-NOVEMBER 5, 1965, PAPERS. [A66-35837 19-05]
Symposium sponsored by NASA and the American Society for Testing and Materials, Committee E-21 on Space Simulation.
Philadelphia, American Society for Testing and Materials (ASTM Special Technical Publication No. 398), 1966, p. 21-42.

Instrumentation is described for making the following measurements on a pressure-suited subject: partial pressures of inspired

gases (oxygen, carbon dioxide), electrocardiogram, respiration rate and depth, blood pressure, body core temperature, metabolic rate, and skin temperature. Acceptable limits for some of these are given. (Author)

A66-35841

MAN-RATING PROVISIONS OF THE BOEING 40- BY 50-FOOT SPACE CHAMBER.

John VanBronkhorst and J. W. Yerkes (Boeing Co., Aerospace Group, Space Environment Simulation Laboratory, Seattle, Wash.).

IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; AMERICAN SOCIETY FOR TESTING AND MATERIALS, PACIFIC AREA NATIONAL MEETING, 5TH, SYMPOSIUM ON MAN RATING OF SPACE SIMULATION CHAMBERS, SEATTLE, WASH., OCTOBER 31-NOVEMBER 5, 1965, PAPERS. [A66-35837 19-05]

Symposium sponsored by NASA and the American Society for Testing and Materials, Committee E-21 on Space Simulation.

Philadelphia, American Society for Testing and Materials (ASTM Special Technical Publication No. 398), 1966, p. 43-52.

The man-rating features of the 40-ft diameter by 50-ft space environment chamber at The Boeing Co. facility in Kent, Wash., are described. This chamber was designed to allow the testing of large, manned, pressurized spacecraft in real-time simulation of earth-orbiting and deep-space missions. Key features pertaining to manned occupancy, including structural design, pumping systems, repressurization systems, controls, monitoring and rescue provisions, and biomedical training and treatment are described. (Author)

A66-35842

MANNED OPERATIONS IN THE NASA MSC LOW-PRESSURE CHAMBERS.

J. H. Chappee (NASA, Manned Spacecraft Center, Structures and Mechanics Div., Space Environment Simulation Branch, Manned Operations Office, Houston, Tex.), R. R. Hessberg (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.), and W. R. Hawkins (NASA, Manned Spacecraft Center, Center Medical Office, Houston, Tex.).

IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; AMERICAN SOCIETY FOR TESTING AND MATERIALS, PACIFIC AREA NATIONAL MEETING, 5TH, SYMPOSIUM ON MAN RATING OF SPACE SIMULATION CHAMBERS, SEATTLE, WASH., OCTOBER 31-NOVEMBER 5, 1965, PAPERS. [A66-35837 19-05]

Symposium sponsored by NASA and the American Society for Testing and Materials, Committee E-21 on Space Simulation.

Philadelphia, American Society for Testing and Materials (ASTM Special Technical Publication No. 398), 1966, p. 53-61.

Discussion of the low-pressure chambers, including those of the Crew Systems Division and the Structures and Mechanics Division of the NASA Manned Spacecraft Center (MSC) at Houston, Tex. A description of the facilities and their status and of anticipated tests is given to explain the man-rating philosophy and procedures utilized at MSC. B.B.

A66-35907

DETECTORS IN BIOLOGY AND MEDICINE.

Charles L. Dunham (U.S. Atomic Energy Commission, Div. of Biology and Medicine, Washington, D.C.).

(Scintillation and Semiconductor Counter Symposium, 10th, Washington, D.C., Mar. 2-4, 1966, Paper.)

IEEE Transactions on Nuclear Science, vol. NS-13, June 1966, p. 9-17. 12 refs.

Detector applications are discussed for three fundamental areas of biology and medicine: radiobiology, photobiology, and nuclear medicine. The detectors discussed include photomultiplier tubes, image intensifier tubes, scintillators, semiconductors and spark chambers. Examples of biomedical work in progress are given which have been made possible by the development of adequate detectors. The biological and medical significance of the work is discussed and some needed detector advances are pointed out. (Author)

A66-35946

NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS.

Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.

Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966. 495 p.

$8.00.

CONTENTS:

Chang and G. W. Yarber (Garrett Corp., Los Angeles, Calif.), p. 3.6.1 to 3.6.20. [See A66-35962 19-14]

MOBILITY AIDS FOR LUNAR SURFACE EXTRAVEHICULAR ACTIVITY. Lynn Bradford (NASA, Marshall Space Flight Center, Ala.) and Kenneth L. Levin (Bell Aerospace Corp., Buffalo, N.Y.), p. 3.8.1 to 3.8.13. [See A66-35963 19-11]

PERFORMANCE ANALYSIS OF AN ASTRONAUT MANEUVERING SYSTEM. Robert W. Lindemuth (USAF, Wright-Patterson AFB, Ohio), p. 3.9.1 to 3.9.16. 12 refs. [See A66-35964 19-05]

ASSOCIATED SPACE EXPERIMENTS AND SIMULATION.

AF-GEMINI SPACE MAINTENANCE EXPERIMENT AND SIMULATION. Chester B. May, John N. Schofield (USAF, Systems Command, Wright-Patterson AFB, Ohio), and Leon A. Vorst (Technology, Inc., Dayton, Ohio), p. 4.1.1 to 4.1.18. 16 refs. [See A66-35965 19-15]

EXTRA-VEHICULAR ACTIVITY TRAINING IN THE T-27 SPACE FLIGHT SIMULATOR. John Prodan and Darius W. Gaskins, Jr. (USAF, Systems Command, Edwards AFB, Calif.), p. 4.2.1 to 4.2.12. [See A66-35966 19-05]

DATA INTERFACES IN EXTRAVEHICULAR ACTIVITY (EVA) EXPERIMENTS. Robert J. von Bose (Ling-Temco-Vought, Inc., Dallas, Tex.), p. 4.4.1 to 4.4.7. [See A66-35967 19-05]

TOOL EXPERIMENTS FOR ASSEMBLY, MAINTENANCE AND REPAIR IN SPACE. Robert J. Schwinghamer (NASA, Marshall Space Flight Center, Ala.), p. 4.6.1 to 4.6.31. 15 refs. [See A66-35968 19-15]

SIMULATION STUDIES OF EVA MISSIONS. Jerome E. Emerson (Bell Aerospace Corp., Buffalo, N.Y.), p. 4.7.1 to 4.7.13. 7 refs. [See A66-35969 19-31]

AUXILIARY CONTROLLABLE SATELLITES - REQUIREMENTS, SIMULATION, DESIGN APPROACH. A. C. Little, R. T. Crouse, and R. L. Stone (General Electric Co., King of Prussia, Pa.), p. 4.8.1 to 4.8.16. [See A66-35970 19-31]

MAN-MACHINE INTERFACE PROBLEMS.

HARD SHELL SUIT PERFORMANCE AS IT RELATES TO SPACE MAINTENANCE AND OTHER EXTRAVEHICULAR ACTIVITIES. William Elkins (Litton Industries, Inc., Beverly Hills, Calif.), p. 5.1.1 to 5.1.6. [See A66-35971 19-05]

REMOTE HANDLING RESEARCH AND POTENTIAL SPACE APPLICATIONS. Billy M. Crawford and William N. Kama (USAF, Systems Command, Wright-Patterson AFB, Ohio), p. 5.2.1 to 5.2.12.

EXTRAVEHICULAR ENVIRONMENT AND MOBILITY CONSTRAINTS ON THE CONFIGURATION OF AN ANTHROPOMORPHIC SPACE SUIT SYSTEM. J. A. Lieske and P. Iribe (Johns Hopkins University, Silver Spring, Md.), p. 5.3.1 to 5.3.10. [See A66-35972 19-05]

A STUDY OF CONTROLLERS FOR AN ASTRONAUT MANEUVERING UNIT. David N. Lovinger (Honeywell, Inc., Minneapolis, Minn.), p. 5.4.1 to 5.4.18. 11 refs. [See A66-35973 19-05]

OPERATOR/TOOL INTERFACE PROBLEM AREAS FOR SPACE MAINTENANCE. David L. Glazer (Martin Marietta Corp., Baltimore, Md.) and Bernard A. Thill, Jr. (North American Aviation, Inc., Columbus, Ohio), p. 5.6.1 to 5.6.10. 14 refs. [See A66-35974 19-05]

SPACECRAFT MAINTAINABILITY AND RELIABILITY.

HOW BIG IS THE SPACE FLIGHT MAINTENANCE PROBLEM? Roy B. Carpenter, Jr. (North American Aviation, Inc., Downey, Calif.), p. 6.1.1 to 6.1.12. 11 refs. [See A66-35975 19-31]

COMPUTER SIMULATION OF MAINTENANCE TRADEOFFS. Paul McKowen (Martin Marietta Corp., Denver, Colo.), p. 6.2.1 to 6.2.20. [See A66-35976 19-31]

GEMINI ACHIEVES OPERATIONAL CAPABILITY - PRELUDE TO FUTURE MANNED MISSIONS. LeRoy E. Day (NASA, Office of Manned Space Flight, Washington, D.C.), p. 6.4.1 to 6.4.15. [See A66-35977 19-31]

A66-35947 #

EVA ASSOCIATED WITH THE ASSEMBLY AND SERVICE OF LARGE STRUCTURES.

Charles Brownell (Goodyear Aerospace Corp., Akron, Ohio), Fred W. Forbes, A. J. Zappanti (USAF, Systems Command, Research and Technology Div., Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio), and J. Schofield (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]

Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.

Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 1.4.1 to 1.4.3.

Subjective examination of the EVA required in the assembly and service of large space stations, antennas, and solar collectors. The expandable structure technology which can be useful for EVA assembly and service missions is also discussed. M.M.

A66-35956 #

EXTRAVEHICULAR MANEUVERING IN SPACE - INVESTIGATION OF A SIMPLIFIED MANEUVERING TECHNIQUE.

Gary P. Beasley (NASA, Langley Research Center, Hampton, Va.).

IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]

Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.

Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 3.1.1 to 3.1.7. 7 refs.

Description of analytical and simulation studies of problems of extravehicular maneuvering and astronaut retrieval using various thrusting devices as well as tether lines. One study indicates that the concept of a simplified integrated maneuvering system made up of a low-powered thrustor and a tether provides adequate capability for extravehicular operations in space. The results of a feasibility investigation of the use of low-thrust jets mounted on the soles of the shoes are described. This study indicates that attitude and motion could be controlled with reasonable precision urging more or less instinctive movements of the feet and legs. M.M.

A66-35957 #

EXTRAVEHICULAR MANEUVERING IN SPACE - "JET SHOE" EXTRAVEHICULAR ACTIVITY DEVICE.

David F. Thomas, Jr. (NASA, Langley Research Center, Hampton, Va.).

IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]

Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.

Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 3.1.8 to 3.1.12. 5 refs.

Results of an investigation of the spaceshoe concept. It was found that a simple low-thrust jet arrangement composed of a pair of jets, one suitably mounted on each shoe, may be used to perform the orientation and translation tasks required in the zero gravity condition of extravehicular space operations. The results of the tests show that thrustors of the order of 1 to 2-1/4 lb not only provided a reasonable feel for attitude control but also provided good translation control. A satisfactory position of the jets was found to be under the ball of the subject's foot. M.M.

A66-35958 #

THE ASTRONAUT MANEUVERING UNIT.

Frank W. Parker (Ling-Temco-Vought, Inc., LTV Astronautics Div., Operations Analysis Section, Dallas, Tex.) and Robert J. Garnett (Ling-Temco-Vought, Inc., LTV Astronautics Div., Dallas, Tex.).

IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]

Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.

Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 3.2.1 to 3.2.18. 12 refs.

This paper presents the results of studies conducted to develop and evaluate an astronaut maneuvering unit (AMU) that would be used for the support of space station experiments and operational activities. AMU experiments and missions were defined and analyzed to determine performance requirements, from which AMU subsystem characteristics and vehicle interface considerations were determined. Design concepts were developed and system tradeoff analyses conducted. Study areas included propulsion, life support, stabilization and control, as well as overall spacecraft system integration. Two AMU concepts were developed: an integrated AMU in which all subsystems are packaged integrally into a single back pack, and a modular AMU which utilizes a separate life support system module. It is concluded that an AMU can support a variety of space missions, and that selection of the integrated or modular AMU configuration for a particular space mission will be dependent upon the specific extravehicular operational requirements, mission safety philosophy, and spacecraft interface considerations. (Author)

A66-35960 #
A SUMMARY OF RESEARCH AS OF JANUARY 1966 IN EXTRA-VEHICULAR MANEUVERING TECHNIQUES FOR SPACE.
Alan J. Willoughby (USAF, Systems Command, Research and Technology Div., Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio), Robert J. Garnett (Ling-Temco-Vought, Inc., LTV Astronautics Div., Dallas, Tex.), and Frank W. Parker (Ling-Temco-Vought, Inc., LTV Astronautics Div., Operations Analysis Section, Dallas, Tex.).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 3.4.1 to 3.4.28. 30 refs.

This paper summarizes the results of research on extravehicular maneuvering performed to date by the Air Force, NASA, and industry in cooperation with the government. The concepts discussed include manual locomotion methods, soaring, and powered maneuvering units, including automatically stabilized units. Findings and conclusions are based upon analysis, computer simulations, frictionless simulators, zero-g flight tests and space tests. Clarification is made of the intended missions of each of the various systems and the innate limitations of each concept. (Author)

A66-35964 #
PERFORMANCE ANALYSIS OF AN ASTRONAUT MANEUVERING SYSTEM.
Robert W. Lindemuth (USAF, Air University, Institute of Technology, Wright-Patterson AFB, Ohio).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 3.9.1 to 3.9.16. 12 refs.

Method of predicting and evaluating the performance of the Modular Maneuvering Unit (MMU) manufactured by Ling-Temco-Vought Astronautics. This method is adaptable to the analysis of other similar astronaut maneuvering units. Performance parameters determined are linear and angular acceleration, velocity, displacement, and fuel consumption. Maneuver and propulsion efficiency factors are defined and calculated. They are measures of the loss of system efficiency due to inertial cross-coupling misalignment of center of mass and thrust line, and intermittent thrustor operation. The efficiency factors are used to evaluate and compare system performance for various maneuvers. F.R.L.

A66-35966 #
EXTRA-VEHICULAR ACTIVITY TRAINING IN THE T-27 SPACE FLIGHT SIMULATOR.
John Prodan and Darius W. Gaskins, Jr. (USAF, Systems Command, Flight Test Center, Aerospace Research Pilot School, Simulation Div., Edwards AFB, Calif.).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 4.2.1 to 4.2.12.

Discussion of the T-27 Space Flight Simulator in operation at the USAF Aerospace Research Pilot School, which utilizes infinity image optics to present a celestial view of extremely high fidelity. A target vehicle is superimposed upon the stars by means of a closed-circuit TV system. Target realism is increased by use of a high scan rate, realistic sun lighting, and a unique model mechanization allowing controlled target tumbling in all three axes. Angular and linear acceleration cues are provided by a motion system with very rapid response. Use of a hardened spacesuit adds to the environmental realism, while aural simulation of the thrustors firing provides acoustical cues. The unique combination of an outstanding visual display and sensitive cues provides excellent training for extravehicular activity. F.R.L.

A66-35967 #
DATA INTERFACES IN EXTRAVEHICULAR ACTIVITY (EVA) EXPERIMENTS.
Robert J. von Bose (Ling-Temco-Vought, Inc., LTV Astronautics Div., Electromagnetics Section, Dallas, Tex.).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 4.4.1 to 4.4.7.

Discussion of the points at which experimental extravehicular activities (EVA) interface with a data system. The factors to be considered at each point to promote the economical recovery of the largest practical quantity of useful data are outlined. An appropriate measurand is defined, and transducer, transmission, data recording, and pictorial data interfaces are described. B.B.

A66-35971 #
HARD SHELL SUIT PERFORMANCE AS IT RELATES TO SPACE MAINTENANCE AND OTHER EXTRAVEHICULAR ACTIVITIES.
William Elkins (Litton Industries, Inc., Space Sciences Laboratory, Beverly Hills, Calif.).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 5.1.1 to 5.1.6.

Description of the Litton rigid, constant-volume pressure space suit, which affords a secure, self-contained extravehicular environment, capable of fulfilling a variety of space roles. Its low torque characteristics impose minimum metabolic costs for the performance of normal tasks. The reduced weight burden is said to permit substantial weight-saving in such expendables as O_2, LiOH, water, and food. B.B.

A66-35972 #
EXTRAVEHICULAR ENVIRONMENT AND MOBILITY CONSTRAINTS ON THE CONFIGURATION OF AN ANTHROPOMORPHIC SPACE SUIT SYSTEM.
J. A. Lieske and P. Iribe (Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Md.).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]

Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 5.3.1 to 5.3.10.

Discussion of the principal factors affecting the design of space-suit aids for the orbital extravehicular working astronaut. The environment in orbital space is discussed, and astronaut protection, extravehicular operations requirements, and the design concept of an extravehicular work pack are considered. B.B.

A66-35973 #
A STUDY OF CONTROLLERS FOR AN ASTRONAUT MANEUVERING UNIT.
David N. Lovinger (Honeywell, Inc., Military Products Group, Systems and Research Div., Minneapolis, Minn.).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 5.4.1 to 5.4.18. 11 refs.

A study of the requirements for a controller for the attitude control system of an astronaut maneuvering unit was performed. The problem of developing a suitable controller concept was approached by a laboratory investigation of limb and body mobility in a pressurized spacesuit, an analysis of a large variety of unconventional controllers - mechanisms operated by the head, eye, breath, tongue, etc. - and the definition of the human factors and systems requirements that must be satisfied. A controller employing a voice-recognition principle was judged to be superior. An industry-wide survey of speech-recognition activities was conducted to determine the state of the art, and a 10-word vocabulary was defined. (Author)

A66-35974 #
OPERATOR/TOOL INTERFACE PROBLEM AREAS FOR SPACE MAINTENANCE.
David L. Glazer (Martin Marietta Corp., Martin Co., Baltimore, Md.) and Bernard A. Thill, Jr. (North American Aviation, Inc., Missile Div., Columbus, Ohio).
IN: NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES, 1ST, ORLANDO, FLA., MARCH 1-3, 1966, PROCEEDINGS. [A66-35946 19-05]
Conference sponsored by the U.S. Air Force Aero Propulsion Laboratory and the Martin Marietta Corp.
Baltimore, Md., National Conference on Space Maintenance and Extra-Vehicular Activities, 1966, p. 5.6.1 to 5.6.10. 14 refs.
Contract No. NAS 9-3161.

Quantitative and qualitative identification of some of the man/machine problem areas in performance of space maintenance. The equipment used during the study is described and the tasks assigned are defined. The study was performed under the following conditions: shirtsleeve, 1 g; unpressurized suit, 1 g; pressurized suit, 1 g; and shirtsleeve, 1/6 g. It is concluded that the pressure suit significantly affects human performance required for efficient space maintenance. The primary reasons for the lower performance level in the suit are the results of fatigue, the glove-tool interface, the stiffening factor of the suit when pressurized - especially the glove fingers, loss of the tactile sense with the glove, and the overall mobility limitations of the suit. M.F.

A66-36065
DREAMING SLEEP IN MAN - CHANGES IN URINE VOLUME AND OSMOLALITY.
A. J. Mandell, B. Chaffey, P. Brill, M. P. Mandell, J. Rodnick, R. T. Rubin, and R. Sheff (California, University, Center for Health Sciences, Dept. of Psychiatry and Dept. of Urology; Wadsworth Veterans Administration Hospital, Los Angeles, Calif.).
Science, vol. 151, Mar. 25, 1966, p. 1558-1560. 15 refs.
Research supported by the University of California; Grant No. NsG-237-62.

Study of the urine volume, osmolality, creatinine concentration, and steroid and catecholamine metabolites serially collected during all-night sleep in man. Epochs of dreaming sleep, as measured by rapid eye movements, are found to correlate consistently with biphasic change in urine volume and osmolality in catheterized human subjects. It is shown that a marked decrease in urine volume and increase in osmolality are followed by a hypotonic diuresis. A.B.K.

A66-36179
HUMAN PERFORMANCE.
John W. Senders (Bolt, Beranek, and Newman, Inc., Cambridge; Brandeis University, Waltham, Mass.).
International Science and Technology, July 1966, p. 58-60, 62, 64, 66-68, 89, 90.

Study of the limits of human performance and of the interaction of man and the machine he operates. The outer boundaries of human performance are reviewed. One set of boundaries is generated by the physical structure of man, another by the details of his physiology, and the third by the mathematical/logical nature of his task. This is illustrated by the task of driving an automobile or of piloting an aircraft. Isolated human functions such as vision and audition are taken into account. The attitude of the human operator toward the task is also a vital factor. The importance of perception in learning is stressed and man's capacity for error is reviewed. M.F.

A66-36230
ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS. (American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965. Papers.)
Edited by Karl Kammermeyer (Iowa, State University, Dept. of Chemical Engineering, Iowa City, Iowa).
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966. 271 p.
$12.

CONTENTS:

A66-36232
MEDICAL CONSIDERATIONS IN THE SELECTION OF SPACE CABIN ATMOSPHERES.
Emanuel M. Roth (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.)
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 13-31. 14 refs.

Consideration of the physical and chemical variables of the space cabin environment and their effect on the human body. A figure is given which indicates the time and pressure dependence of oxygen toxicity. The range over which oxygen pressure may vary runs from less than 4 psi with 100% O_2 down to 20% O_2 at sea level. The fire and blast hazard of pure oxygen environments is discussed. Inert gas bubble factors in decompression sickness are analyzed, and the radioprotective effect of metabolically inert gases are discussed. D. P. F.

A66-36233
WEIGHT OPTIMIZATION OF FLIGHT TYPE CRYOGENIC TANKAGE SYSTEMS.
Blase J. Sollami (Bendix Corp., Davenport, Iowa).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 32-75.

Study of the cryogenic storage supply systems of oxygen and hydrogen both for fuel cell operation and for life support in manned spacecraft. In view of the large quantities of cryogen required weight optimization of reliable storage systems is a prime prerequisite. It is seen that the variables in the analysis include the quantity of cryogen, the vessel shape, standby time, and minimum tankage pressure. Two storage techniques are considered, one in which the nonvented storage concept is used and the other based on the vented concept. The parameters which mostly affect cryogenic system storage weight are discussed. For standby times of 90 to 270 days it was found that the nonvented system in spherical vessels yields the minimum weight for oxygen whereas vented storage in spherical tanks is optimal for hydrogen. D. P. F.

A66-36234
AN ELECTROLYTIC PROCESS FOR CARBON DIOXIDE SEPARATION AND OXYGEN RECLAMATION.
W. E. Arnoldi (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 76-103.

Description and discussion of a method for deriving a large part of the oxygen required for respiration from the CO_2 exhaled on manned space vehicles. The four basic functions to be performed by an ideal oxygen reclamation system are examined; they include separation of CO_2 from the cabin atmosphere, decomposition of CO_2, delivery of O_2 to the cabin atmosphere, and carbon storage. In the system described, CO_2 is absorbed from a gas stream by direct contact with the electrolyte, O_2 is evolved at the anode, and carbon is accumulated in solid form at the cathode. Lithium, which is reduced at the cathode, reacts chemically with the CO_2 in solution to deposit solid carbon. D. P. F.

A66-36235
CARBON DIOXIDE CONVERSION FOR OXYGEN RECOVERY.
John F. Foster (Battelle Memorial Institute, Columbus, Ohio).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 104-119. 12 refs.

Consideration of the critical need for CO_2 conversion to extend immediate mission capabilities to much longer than the present limitation of 30 to 60 days based on stored oxygen. A number of different concepts are introduced for the conversion of CO_2 using a qualitative appraisal of their complexity and reliability as estimated by specific criteria. The hydrogenation phenomena and electrolysis of CO_2 are considered. Systems for CO_2 management are compared, and the conversion of CO_2 in bioregenerative systems is described. D. P. F.

A66-36236
GASEOUS DIFFUSION CELLS.
Coleman J. Major and Richard W. Tock (Akron, University, Akron, Ohio; Iowa, State University, Iowa City, Iowa).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 120-144. 7 refs.
Contract No. NASr-73.

Description of a new design for gaseous diffusion cells constructed to remove the carbon dioxide from a spacecraft's life-support system and consisting of alternating thin layers of a selective plastic membrane and a porous substance which will replace the tubes in a heat exchanger model. This technique permits hundreds of thousands of individual cell compartments to be connected in parallel. After ascertaining the materials best suited to cell construction, experiments were conducted for assembling a cell unit. The theory for a single-stage unit for separation by selective permeation is developed. The apparatus and procedures are outlined; the experimental results are analyzed in terms of permeability coefficients substrate porosity, and cell assemblies. D. P. F.

A66-36237
NEW APPROACHES TO CONTAMINANT CONTROL IN SPACECRAFT.
Eric E. Auerbach and Sid Russell (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 145-170.

Review of some of the investigations to quantitatively define trace contamination control requirements for spacecraft. Control methods based on (1) leakage, (2) lithium hydroxide, and (3) activated charcoal are described. Contaminant generation rates are expressed in a table which also lists the allowable concentrations for a specific two-man mission. It is found that all contaminants can be removed by (1) filtration, (2) physical sorption, (3) chemical sorption, (4) chemical or catalytic conversion to nontoxic end products, and (5) conversion to a more easily controllable contaminant. Each of these alternate methods is compared and analyzed with respect to certain specific contaminants. D. P. F.

A66-36238
AN INTEGRATED PROGRAM APPROACH TO THE CONTROL OF SPACE CABIN ATMOSPHERES.

J. E. Cotton, T. M. Fosberg, L. E. Monteith, and R. L. Olson (Boeing Co., Aero-Space Div., Seattle, Wash.).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 171-185. 18 refs.

Consideration of two methods for the control of contaminants in a manned space system - the first dealing with minimizing contaminant formation and the second involving techniques for contaminant removal. Contaminant release rates, human tolerance levels, and control system operating characteristics are determined and used to establish design requirements and specifications. The program for coordinating all materials and activities to provide a habitable environment is divided into three basic tasks: (1) contaminants identification and an estimate of their release rates, (2) estimation of allowable concentration, and (3) control system specifications. D. P. F.

A66-36239
ALGAL BIOREGENERATIVE SYSTEMS.
R. L. Miller and C. H. Ward (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 186-222. 173 refs.

Comparison and evaluation of the available information on algal photosynthetic gas exchange systems. Regeneration requirements, factors affecting algal growth, engineering design and performance of algal exchangers, and future development are considered in detail. D. P. F.

A66-36240
CARBON DIOXIDE CONTROL BY ENZYMATIC REACTIONS IN SPACECRAFT ATMOSPHERE.
G. Graf, R. E. Hoagland, W. R. Carl, and S. R. Kurowsky (Youngstown University, Dept. of Chemistry, Youngstown, Ohio).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 223-248. 24 refs.
USAF-sponsored research.

Experimental results of enzymatic reactions for carbon dioxide control of closed atmospheres by the hydro-lyase induced hydration and dehydration of CO_2, and CO_2 exchange based on a multienzyme system. It was found possible to use carbonic anhydrase for reversible CO_2 absorption at high feed-gas rates and at low partial pressures. The CO_2 absorption and desorption were alternated in cycles over 7-day periods, each cycle consisting of 90-min absorption and 60-min desorption. The absorbing liquid contained at least 0.005 to 0.02% enzyme suspended in a solution of "Tris," the free base, 2-amino-2 (hydroxymethyl)-1, 3-propanediol; the desorption phase can be shortened by increasing the enzyme concentration. For intermittent operation, efficiencies of 0.66 to 0.70 are readily achieved. The mechanism of CO_2 fixation by pyruvate, reduction of oxaloacetate to malate, and subsequent oxidative decarboxylation of malate to yield CO_2 are discussed. D. P. F.

A66-36241
THERE'S NO PLACE LIKE SPOME.
Isaac Asimov (Boston University, School of Medicine, Dept. of Biochemistry, Boston, Mass.).
(American Chemical Society, Symposium, Atlantic City, N.J., Sept. 13, 1965, Paper.)
IN: ATMOSPHERE IN SPACE CABINS AND CLOSED ENVIRONMENTS.
Edited by Karl Kammermeyer.
New York, Appleton-Century-Crofts, Division of Meredith Publishing Co., 1966, p. 249-265.

Consideration of the future possibilities of adapting asteroids so as to make them capable of supporting human life for an indefinitely long period of time, giving an analysis of the changes in human attitude that this environment will require. The word "spome" - a contraction of space home - is applied to these asteroidal bodies which would have spherical levels hollowed out and nested like the layers in an onion. It is concluded that spinning such a spome to produce an artificial gravitational field is not worth the energy expended and that therefore the human beings living within such a body will in time adapt to null g conditions. Humans will then be divided into g-type and null-g-type. Applying the term "spomoid" to the cabin of the spacecraft it is reasoned that because of the time requirements inherent in interstellar missions the trend in stellar exploration will be from the spomoid to the spome. D. P. F.

A66-36243
AN INVESTIGATION OF THE EFFECT OF TOTAL SIMULATION SYSTEM MASS ON CERTAIN HUMAN FORCE OUTPUTS IN TRACTIONLESS ENVIRONMENTS.
I. Streimer (San Fernando Valley State College, Northridge, Calif.), D. P. W. Turner, and K. Volkmer (North American Aviation, Inc., Space and Information Systems Div., El Segundo, Calif.).
Journal of the Astronautical Sciences, vol. 13, May-June 1966, p. 106-109. 24 refs.

Investigation of certain force-producing capabilities of operators performing manual tasks in a reduced-traction environment and the effects of total man-simulator mass upon these results. The results indicate that significant decrements in force output capabilities are to be anticipated from an unrestrained space worker with the decrement magnitude largely derived from task biomechanical considerations. It appears that the greater the normal traction force developing capacity, the greater the decrement appearing in the unrestrained nontractive condition. B. B.

A66-36283
MATHEMATICAL THEORY OF VISUAL AND TELEVISUAL DETECTION LOBES.
E. Heap (Ministry of Aviation, Royal Aircraft Establishment, Farnborough, Hants., England).
Institute of Mathematics and Its Applications, Journal, vol. 2, June 1966, p. 157-185. 16 refs.

Review of recent developments in the application of mathematics to the evaluation of human visual performance. Although the spread of automation is proceeding fast in the modern world of technology there remains a continual need for the human being to monitor and supervise many system processes. Also the human eye is still the best detection device in many circumstances, some of which, it is shown, can be represented mathematically. Thus, the visual aspects of man's capability are inevitably involved as part of current man-machine systems. Furthermore, television is coming into wider usage as an aid to detection and supervision, since it enables the observer to sit remotely from the direct viewing situation, which might be either dangerous or inconvenient. Mathematical extensions of visual detection models into the television mode are also given, showing the advantages which can be obtained from magnification and contrast enhancement effects in comparison with the disadvantages of restricted fields of view and limited resolution. A first step is taken, therefore, toward expressing some important human factors in mathematical form. M.F.

A66-36373
CONSEQUENCE OF HEART-TO-FOOT ACCELERATION GRADIENT FOR TOLERANCE TO POSITIVE ACCELERATION.
J. W. Nyberg, R. H. Grimes, and W. J. White (Douglas Aircraft Co., Inc., Advance Biotechnology Dept., Santa Monica, Calif.).
Aerospace Medicine, vol. 37, July 1966, p. 665-668. 7 refs.
Research supported by the Douglas Aircraft Independent Research and Development Program; Contract No. AF 04(695)-679.

Consequences of heart-to-foot acceleration gradients on tolerance to positive acceleration (+ G_z) were determined in three studies on a variable radius centrifuge. In the first, tolerance was measured at radii ranging from 172 to 30 in., corresponding to gradients of 20 to 116%, respectively. As the radius decreased, the tolerance increased. At the shortest radius, discomfort in the legs resulting from the high acceleration at the feet precluded tolerance determination. In the second and third studies, low-intensity bioassay lights were used as a means of determining tolerance at lower levels of acceleration. In the third study, a slow onset run to blackout was used as a means of reducing the number of runs. Radii of 156 and 16 in. and rates of onset of 0.2 G/sec and 3.0 G/sec were used. At the long radius, tolerance was + 3.9 G_z during slow onset, and + 3.8 G_z during fast onset. At the 16 in. radius, during fast onset, tolerance was + 3.0 G_z and, during the slow onset, tolerance was + 3.6 G_z, + 3.3 G_z, and + 3.4 G_z. (Author)

A66-36374
PHASE SHIFTS OF THE HUMAN CIRCADIAN SYSTEM AND PERFORMANCE DEFICIT DURING THE PERIODS OF TRANSITION.
I - EAST-WEST FLIGHT.
G. T. Hauty (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla., Delaware, University, Dept. of Psychology, Newark, Del.) and T. Adams (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).
Aerospace Medicine, vol. 37, July 1966, p. 668-674. 16 refs.

At periodic intervals throughout the biological day biomedical assessments were made for a week prior to jet flight to Manila, for 8 days of layover at Manila and for a week following return to the environment of origin. The data revealed that for the physiological functions assessed time displacement effected a primary shift of phase of circadian periodicity which, for rectal temperature and heart rate, required 4 days for completion and, for palmar evaporative water loss, approximately 8 days. Return back to the environment of origin also effected a shift of phase requiring only 1 day for completion. Behavioral integrity was degraded during the primary period of transition and, to a lesser extent, during the period of transition occasioned by return to the environment of origin but duration of behavioral impairment was much shorter than the lag time of physiological phase shifts. (Author)

A66-36375 #
EFFECT OF ANTERIOR INTERCOSTAL NERVE BLOCK ON THE THRESHOLD OF THORACIC PAIN ASSOCIATED WITH g_z AND g_x VIBRATION.
J. H. Henzel, N. P. Clarke, and G. C. Mohr (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 37, July 1966, p. 682-687. 18 refs.
USAF-sponsored research.

In investigating the origin of chest pain associated with $G_z \pm ng_z$ and $G_x \pm ng_x$ sinusoidal vibration, the effect of anterior chest wall anesthetization was studied. Subjects were exposed to vibration of increasing amplitude, and the acceleration required to induce perceptible chest pain was taken as the threshold. Two randomly ordered threshold determinations were made in each test. In one, vibration was preceded by bilateral anesthetization of the second through sixth intercostal nerves. In the other intradermal infiltration of anesthetic created a sensation somewhat similar to this without actually blocking the nerves; this provided a control condition with minimal subjective bias for comparison. Subsequent to intercostal nerve block, there was a statistically significant ($p < 0.01$) increase in threshold of chest pain for both orientations of vibration. These results strongly suggest that vibration induced chest pain originates in the chest wall and not in the more critical cardiac-great vessel complex. (Author)

A66-36376
VALSALVA MANEUVER - POSSIBLE USE IN SPACE FLIGHT AS A TEST OF CARDIOVASCULAR FUNCTION.
Albert B. Craig, Jr. (Rochester, University, School of Medicine and Dentistry, Dept. of Physiology, Rochester, N. Y.).
Aerospace Medicine, vol. 37, July 1966, p. 687-690. 12 refs.
U. S. Public Health Service Grant No. 09676-01.

It is suggested that the heart rate response to a standardized Valsalva maneuver performed at intervals during spaceflight might have predictive value in regard to the problem of developing orthostatic intolerance. A group of subjects was immersed for 1 hr in warm water. This heat stress caused a greater increase in heart rate and a greater reduction of the pulse pressure in response to tilting than during the same test performed before immersion. It was also observed that the heart rate increase during the Valsalva done when the subject was in air was greater after the thermal stress. The heart rate response to the breath-hold performed in water changed from a bradycardia to a tachycardia. These changes were attributed to the stress of the warm environment, as they were not noted after cool water immersion. (Author)

A66-36377
VESTIBULAR REACTIONS OF COSMONAUTS DURING THE FLIGHT IN THE "VOSKHOD" SPACESHIP.
E. M. Iuganov, A. I. Gorshkov, I. I. Kasian, I. I. Brianov, I. A. Kolosov, V. I. Kopanev, V. I. Lebedev, N. I. Popov, and F. A. Solodovnik (Novosti Press Agency, Moscow, USSR).
(Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, vol. 30, no. 6, 1965.)
Aerospace Medicine, vol. 37, July 1966, p. 691-694. 8 refs. Translation.

The vestibular tolerance of members of the crew of the "Voskhod" ship to a 24-hour stay in a zero-weight environment was found to differ from subject to subject; it was high in the case of Komarov and lower in the case of Egorov and Feoktistov. Differences in tolerance are connected with the differences in the initial sensitivity of the vestibular apparatus, and different lengths of vestibular training (sufficiently long in the case of Komarov and shorter in the case of Feoktistov and Egorov). An intense three-month ground vestibular training of persons with a vestibular analyzer of an average sensitivity cannot secure the required vestibular tolerance to a zero-weight environment. (Author)

A66-36378
PERSONALITY DEVELOPMENT - APPLICATIONS OF THEORY TO PROBLEMS OF AEROSPACE SELECTION.
Paul Fine (Michael Reese Hospital, Psychiatric Clinic, Chicago, Ill.) and Charles F. Jennings (USAF, Systems Command, Aerospace Medicine Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, July 1966, p. 695-701. 29 refs.

Review of recent findings about psychological development and suggestion of two procedures to apply resultant theory to aerospace problems. These findings derive from divergent disciplines such as infant and child development, child psychiatry, ethology and psychophysiology. These findings all contain a common concern with the process of personality development. Familiarity with this process gives one an ability to make plausible predictions about how an individual will function in specific situations. The ages of developmental stages and the determinants of childhood behavior are tabulated. Two examples of how developmental theory was adapted to systematic research are briefly described. It is pointed out that recent research and findings in the field of personality development could have a wide range of application to aerospace problems. M. F.

A66-36379 #
BACTERIOLOGIC POTABILITY OF CONDENSATE WATER FROM HEAT EXCHANGERS OF PRESSURE SUITS.
James E. Moyer and Y. Z. Lewis (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Biological Systems Section, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, July 1966, p. 701-703. 6 refs.

The possibility of utilizing water condensates recovered from the heat exchangers of pressure suits as an emergency source of drinking water was investigated. Condensate samples were collected in sterile containers at five-hour intervals and subjected to quantitative (MPN/100 ml) and qualitative bacteriologic analysis. Several samples were retained in the sealed vessels and reanalyzed following storage for 12 days at room temperature. Results indicate that condensate water may serve as an emergency source of potable water provided it is consumed within a short period of time following collection. Storage of the condensates results in a water of an unacceptable bacteriologic purity for imbibition purposes. (Author)

A66-36380 #
HEART RATE RESPONSE OF ANESTHETIZED AND UNANESTHETIZED DOGS TO NOISE AND NEAR-VACUUM DECOMPRESSION.
Julian P. Cooke and Richard W. Bancroft (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, July 1966, p. 704-709. 14 refs.
USAF-sponsored research.

Study of the effect of a sudden intense noise and near-vacuum decompression on the cardiac rate of anesthetized and unanesthetized dogs. Animal studies indicate that a sudden intense noise, as might accompany an unscheduled loss of cabin pressure, will act as an additional stress sufficient to elicit significant cardiac rate increase in unanesthetized dogs as compared to a lack of an increase in anesthetized animals. No relationship between mortality and anesthesia or consciousness has been shown to exist, but the magnitude of these observed differences in cardiac rate in response to sound in unanesthetized and anesthetized animals is believed to be significant in decompression studies when response of the cardiovascular system is considered. Responses to noise are reported to serve as a sensitivie indicator of neurologic responses. M. F.

A66-36381 #
RESIDUAL PATHOLOGIC CHANGES IN THE CENTRAL NERVOUS SYSTEM OF A DOG FOLLOWING RAPID DECOMPRESSION TO 1 mm. Hg.
Harold W. Casey, Richard W. Bancroft, and Julian P. Cooke (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, July 1966, p. 713-718. 13 refs.
USAF-sponsored research.

Following rapid decompression to 1 mm Hg, with a 120-sec exposure, one of seven dogs developed a severe paralytic syndrome. A gradual and steady improvement in the paralysis occurred during a 67-day clinical observation period. Electrocardiogram tracings, obtained during and immediately following decompression, revealed transient alterations that were not associated as a major contributing factor in the pathologic lesions observed in the brain and spinal cord of this animal. The most significant pathologic changes were found in the white portions of the brain and spinal cord. The brain had both focal areas of malacia and a mild diffuse degeneration of myelinated fibers. Minor lesions were observed in the Purkinje cells of the cerebellum and in a paraventricular nuclei of the medulla. Lesions in the spinal cord were confined to the myelinated portions and, although present throughout its length, they were more severe in the anterior cervical and mid-thoracic segments. The appearance of the lesions and their predilection for the white matter, the lower degree of vascularity and lower sensitivity to anoxia of the white matter as compared to the gray matter, and the high lipid content of the white matter suggest that bubble formation of dissolved gases within the myelinated fibers was of major importance in the pathogenesis of the diffuse lesions found in the myelinated portion of the brain and spinal cord. (Author)

A66-36382
EFFECT OF WEIGHTLESSNESS UPON THE NORMAL NYSTAGMIC REACTION.
Margaret M. Jackson (NASA, Manned Spacecraft Center, Houston, Tex.) and C. W. Sears (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 37, July 1966, p. 719-721. 21 refs.

Twenty individuals were subjected to manually imposed angular accelerations about the vertical axis during the weightless period of parabolic flight. Continuous electrooculographic recordings and infrared motion pictures of eye movements were obtained before, during, and after each rotational period. Rotations of the Bárány chair and aircraft accelerations were also recorded. Control tests were conducted on the ground and in flight at 1 and 2 g's. The traces obtained were evaluated visually. Each subject exhibited the nystagmic response both during and following rotation in weightlessness. This response appeared about the same as those recorded at 1 and 2 g's. (Author)

A66-36383
FATIGUE IN AVIATION ACTIVITIES.
Stanley R. Mohler (Federal Aviation Agency, Office of Aviation Medicine, Aeromedical Applications Div., Washington, D.C.).
Aerbspace Medicine, vol. 37, July 1966, p. 722-732. 105 refs.

This paper provides a survey of work in the field of aviation fatigue. Early work and studies now in progress are included. The nature of fatigue itself is discussed, along with possible factors that contribute to both physical and mental fatigue. Topics covered include flight-time limitations, indicators of excessive fatigue, new developments related to intercontinental flights and Forest Service flights. (Author)

A66-36431
KOROTKOFF SOUNDS AT DIASTOLE - A PHENOMENON OF DYNAMIC INSTABILITY OF FLUID-FILLED SHELLS.
Max Anliker (NASA, Ames Research Center, Div. of Environmental Biology, Moffett Field, Calif.) and K. R. Raman (Itek Corp., Vidya Div., Palo Alto, Calif.).
International Journal of Solids and Structures, vol. 2, July 1966, p. 467-491. 34 refs.
Research supported by the National Academy of Sciences - National Research Council; Contract No. NAS 2-1137.

A theoretical analysis of the phenomenon of Korotkoff sounds at diastole is presented together with experimental results. The formulation of the mathematical analysis is based on facts derived from fundamental experiments with a laboratory model which simulates the brachial artery and the sphygmomanometer and which exhibits Korotkoff sounds under controlled conditions. The Korotkoff sounds at diastole are interpreted as a phenomenon of dynamic instability (oscillations with increasing amplitude), the instability being induced by the application of a pressure cuff. The results of the analysis verify experimental observations regarding the effects of the cuff length, wall thickness and elasticity of the vessel on the diastolic pressure. They also yield good approximations for the difference between the auscultatory diastolic pressure and the true minimum of the pressure in the simulated artery as well as in the human brachial. The results indicate that the auscultatory reading is always higher than the true minimum of the intraluminal pressure by an amount that depends on the physical and geometric properties of the vessel. Besides this, the theoretical analysis predicts that the Korotkoff sounds near the diastolic pressure have predominantly low frequency components and that with increasing cuff pressure the sounds not only become more intense but also begin to include components with a higher pitch. (Author)

A66-36435
RESPIRATION INDUCED BY BLUE LIGHT.
Wolfgang Kowallik, and Hans Gaffron (Florida State University, Institute of Molecular Biophysics, Tallahassee, Fla.).
Planta, vol. 69, 1966, p. 93-95. 9 refs.
Grant No. NGR-10-004-018.

The high rate of respiration in Chlorella which is found after feeding with glucose or after a longer period of photosynthesis, declines in the dark in the course of hours to about a quarter of its original value. Blue-green light ($\lambda < 550$ mμ) specifically counteracts this decline and maintains the high rate. This blue light effect is independent of photosynthesis. (Author)

A66-36436
RADIATION-STIMULATED DNA SYNTHESIS IN CULTURED MAMMALIAN CELLS.
R. E. Rasmussen (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.) and R. B. Painter (California, University, Medical Center, Laboratory of Radiobiology, San Francisco, Calif.).
Journal of Cell Biology, vol. 29, no. 1, 1966, p. 11-19. 11 refs.

A type of DNA synthesis in mammalian cells that is stimulated by ultraviolet light has been studied by means of radioautography and density gradient centrifugation. The characteristics of this synthesis are: (1) it is not semiconservative; (2) it is enhanced by the presence of 5-bromodeoxyuridine in the DNA molecule; (3) the degree of stimulation is dose dependent; (4) there is less variability in the rate of incorporation of H^3-thymidine during this synthesis than during normal DNA synthesis; (5) it occurs in cells that are not in the normal DNA synthesis phase (G_1 and G_2 cells). This kind of synthesis has been found in cultured cell lines from five different species; however, in some strains, the presence of bromouracil in the DNA is required before it can be demonstrated by radioautography. (Author)

A66-36439 #
PILOT ERROR AND AIRCRAFT ACCIDENTS.
E. M. B. Smith (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 1-13.

Definition of the concepts of pilot and aircrew error, with an analysis of the factors contributing to such errors which are an important cause of fatal accidents. Pilot and aircrew error is classified into: disciplinary, preflight, taxiing, incorrect cockpit drills, misuse of emergency system, faulty operational techniques, and errors of skill. An analysis of the prime causes of error accidents for helicopters, piston-engined aircraft, and jet craft indicates that errors of skill predominate in each case, constituting 70% of the total. Background factors responsible for pilot error are analyzed, including fatigue, inadequate flight aids, and faulty instrument design. The high-risk stages for pilots are enumerated, and the effects on pilots of age, fatigue, and emotional stress are considered. D.P.F.

A66-36441 #
INVESTIGATION OF THE AIRCRAFT CATASTROPHE AT INNSBRUCK [ZUR AUFKLÄRUNG DER FLUGZEUGKATASTROPHE BEI INNSBRUCK].
F. J. Holzer (Innsbruck, Universität, Institut für gerichtliche Medizin, Innsbruck, Austria).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 17-25. 14 refs. In German.

Review of the medical inquest into the crash of the Britannia 312, near Innsbruck on Feb. 2, 1964. The techniques by which the 81 immediately located bodies were positively identified within 12 days are outlined. R.A.F.

A66-36442 #
INVESTIGATION OF AIRCRAFT ACCIDENTS IN THE CIVIL SPHERE [AUFKLÄRUNG VON FLUGUNFÄLLEN IM ZIVILEN BEREICH].
Hans-J. Reichel (Luftfahrt-Bundesamt, Braunschweig, Flughafen, West Germany).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 26-28. In German.

Outline of the institutions and techniques used in West Germany to investigate accidents involving civil aircraft. All accidents, as well as disturbances which could have led to accidents, are investigated by the federal government. R.A.F.

A66-36443 #
THE ROLE OF THE AIR FORCE PATHOLOGIST IN ACCIDENT INVESTIGATION.
P. J. Stevens (Royal Air Force, Institute of Pathology and Tropical Medicine, Halton, Bucks., England).
(Flugmedizinische Arbeitstagung, 8th, Fürstenfeldbruck, West Germany, Nov. 9, 10, 1964, Paper.)
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 28-39. 6 refs.

Outline of some of the more interesting aspects of aviation pathology work. The topics discussed include the plan of investigation, pre-existing disease, environmental factors, accident reconstruction, safety-equipment appraisal, and morbid anatomy of healthy adults. R.A.F.

A66-36444 #
PROBLEM OF IDENTIFICATION AFTER AN AIRCRAFT ACCIDENT [ZUM PROBLEM DER IDENTIFIKATION BEIM FLUGUNFALL].
S. Krefft (Bundesministerium der Verteidigung, Führungsstab der Luftwaffe, Flugmedizinisches Institut, Arbeitsgruppe Flugunfallmedizin, Fürstenfeldbruck, West Germany).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 40-48. 14 refs. In German.

General review of the problem of identifying the victims of aircraft accidents. Medical and scientific techniques used to identify corpses and precautions which can be taken before an accident are outlined. R.A.F.

A66-36445 #
CORONARY DISEASES AND FLIGHT SAFETY [KORONARERKRANKUNGEN UND FLUGSICHERHEIT].
H. W. Kirchhoff (Bundesministerium der Verteidigung, Führungsstab der Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 49-52. 15 refs. In German.

Review of the significance of coronary diseases to the safe operation of aircraft. Means for minimizing the effects are briefly discussed. R.A.F.

A66-36446 #
FLIGHT SAFETY AND EXPERIENCES WITH PILOTS TREATED IN HOSPITALS [FLUGSICHERHEIT UND ERFAHRUNGEN MIT IM LAZARETT BEHANDELTEN FLUGZEUGFÜHRERN].
F. Ausbüttel.
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 12, May 1966, p. 53-56. In German.

Case reviews of pilots treated in a West German military hospital from Jan. 1, 1963, to Oct. 10, 1964. Because the 34 pilots constituted only about 0.7% of the patients treated by the hospital during this period, the sample is not considered significant or representative. R.A.F.

A66-36645
PSYCHOPHYSIOLOGICAL ASPECTS OF MAN IN SPACE.
H. F. Huddleston (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Spaceflight, vol. 8, Aug. 1966, p. 268-274.

Discussion of the survival of man in an extremely hostile environment, within which the entire living situation may be psychologically very strange. Biological problems caused by the lack of atmosphere are considered. These involve oxygen supply, temperature extremes, meteorites, and radiation. The effects of high accelerations, zero gravity, and vibration are reviewed with reference to visual acuity, the need to move about or to move objects, and to accomplish feeding, drinking, and toilet functions. Psychological problems may arise as a result of confinement, isolation, and sensory impoverishment. Brief information is given concerning the experiences of all astronauts (including Soviet) who have entered space. F.R.L.

A66-36647
VESTIBULAR FUNCTION IN SPACE FLIGHT.
M. A. Bodin (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Spaceflight, vol. 8, Aug. 1966, p. 285.

Brief discussion of experiments carried out to investigate human vestibular responses to combined stimulation by angular and linear accelerations. Subjects were rotated about orthogonal body axes and, following impulsive deceleration, repositioned with respect to the gravitational vertical, while electrooculograms were recorded. Comment is made that the Soviet cosmonauts who experienced most trouble from vestibular disturbances were those who through background and training were least likely to have developed a high degree of habituation. F. R. L.

A66-36860 #
ON THE PROCESS OF ADAPTATION BY THE HUMAN CONTROLLER.
Jerome I. Elkind and Duncan C. Miller (Bolt, Beranek, and Newman, Inc., Cambridge, Mass.).
International Federation of Automatic Control, Congress, 3rd, London, England, June 20-25, 1966, Paper. 13 p. 12 refs.
Contract No. AF 33(657)-10124.

Extensive experimental study of the adaptation of human controllers to sudden changes in plant dynamics. Human controller characteristics in time-invariant situations are discussed, and a typical adaptive response is outlined. A model for the adaptation by highly-trained controllers is detailed, and methods of measuring human adaptive performance are considered. B. B.

A66-36861 #
SYSTEM PERFORMANCE AND OPERATOR STATIONARITY IN MANUAL CONTROL SYSTEMS.
D. T. McRuer, D. Graham (Systems Technology, Inc., Hawthorne, Calif.), E. S. Krendel, and W. C. Reisener, Jr. (Franklin Institute, Philadelphia, Pa.).
International Federation of Automatic Control, Congress, 3rd, London, England, June 20-25, 1966, Paper. 11 p. 14 refs.
Contracts No. AF 33(616)-7501; No. AF 33(657)-10835.

Treatment of a simple quasilinear mathematical model for systems comprising a human operator controlling elementary but typical controlled elements which is representative of models data derived from experiments. Pertinent data are adduced to justify the model; in particular, it is shown that for trained and motivated operators, the variability in behavior which might influence overall performance is actually quite small. The model is used to estimate a performance measure, the mean-squared error in tracking, and there is close agreement between these estimates and measured results in tracking tasks. B. B.

A66-36932 #
HUMAN PERFORMANCE AS A FUNCTION OF CHANGES IN ACOUSTIC NOISE LEVELS.
Richard W. Shoenberger and Charles S. Harris (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Journal of Engineering Psychology, vol. 4, no. 4, 1965, p. 108-119. 19 refs.
USAF-sponsored research.

Experimental examination of the effect of noise on the performance of people. The specific hypothesis examined was that the greater the magnitude of the change in intensity, the greater will be the decrement in performance produced. Sixteen male subjects performed a relatively simple task involving ordered sequences of numbers under four acoustic conditions: 85, 95, 110 db, and complete quiet. Test conditions are detailed, instruments and procedures are described, and white noise bands specified. It is concluded that the results indicate a partial support for the original hypothesis and are of theoretical importance with regard to the influence of prevailing stimulation levels on the reticular activating system. However, in spite of the noted decrement in performance with increasing noise intensity, the difference observed between the worst and best performance is very small, and thus, the practical importance of this particular phenomenon may not be very great. M. L.

A66-36933
EFFECTS OF AIR IONIZATION UPON THE PERFORMANCE OF A VIGILANCE TASK.
Charles G. Halcomb and Roger E. Kirk (Baylor University, Waco, Tex.).
Journal of Engineering Psychology, vol. 4, no. 4, 1965, p. 120-126. 27 refs.
Research supported by Baylor University.

Assessment of the effects of positive and negative ionization on the performance of a vigilance task. Such a task is defined as one requiring the detection of serially presented stimuli during long work periods when the individual has little or no prior knowledge of the spatial patterns or temporal sequence of the stimuli. Forty male college students monitored a CRT display of light deflections that were made to move at random intervals. The experimental period lasted 4.5 hr. It is concluded that the hypothesis that an individual's ability to perform a vigilance task is subject to less decrement if he works in an environment containing negative rather than positive ions is verified. M. L.

A66-36942
ADAPTIVE COLOR SHIFTS.
Horst Scheibner (Rochester, University, Center for Visual Science, Rochester, N.Y.).
(Renshaw Vision Conference, Columbus, Ohio, May 6, 1965, Paper.) Optical Society of America, Journal, vol. 56, July 1966, p. 938-942. 29 refs.

Some experiments on chromatic adaptation are reviewed. The adaptive color shifts due to changes of chromatic adaptation are interpreted as linear mappings. The results show that the special type of mappings known as the von Kries coefficient law does not generally hold. One conclusion is that the processes connected with chromatic adaptation cannot take place at the first retinal stage of the visual pathway alone, but also at higher stages. (Author)

A66-36944
EYE-MOVEMENT RESPONSES TO STEP AND PULSE-STEP STIMULI.
Leon L. Wheeless, Jr., Robert M. Boynton, and Gerald H. Cohen (Rochester, University, Rochester, N.Y.).
Optical Society of America, Journal, vol. 56, July 1966, p. 956-960.
Research supported by Bausch and Lomb; U.S. Public Health Service Grant No. NB-00624.

Experiments demonstrating that the visual system is sometimes able to cancel an eye-movement response to a pulse, on the basis of information contained in the subsequent step, to which it responds instead. As the step is delayed by progressively longer pulses, the probability increases that a response to the pulse will occur. If a response does occur in the direction of the step, it begins about 325 msec after the beginning of the step. This latency is independent of pulse time W and is about 40 msec longer than the latency of responses to steps presented alone. It is concluded that the visual system utilizes this 40 msec to operate upon a latent response to a pulse, and thereby to cancel its overt manifestation (eye movement) before initiating a response to the second, incompatible stimulus. M. F.

A66-36945
NEW THEORY ON APPARENT MOVEMENT.
Martha J. Guastella.
Optical Society of America, Journal, vol. 56, July 1966, p. 960-966. 8 refs.

A theory is presented to explain the difference between the true motion of a figure and its apparent motion, as in the Ames trapezoid illusion. Of central importance are the changes in geometric relationships between the boundaries of a figure as they project on the retina. The changes in retinal image that accompany rotation of the figure have been analyzed by use of a unique picture-plane model, to which the dimension of depth is added. The only assumption necessary to predict the perceived effect from the geometry of the illusion is that the observer will be most affected by whatever element of the retinal image is changing at the greatest rate. Apparent size, displacement, and rates of change are quantified. The interrelationship of the horizontal and vertical edges are shown. The projection of the edge of the figure farthest from the observer recedes in an

opposite direction and at varying speed and size from the true edge. The lack of a perfect one-to-one relationship between the physical and psychological stimulus is determined by the nature of the projection of the physical stimulus. While other theories base their explanations on past experience, this theory designates the mechanisms underlying the illusion. (Author)

A66-36946
ANALYSIS OF RESPONSE PATTERNS OF LGN CELLS.
Russell L. De Valois, Israel Abramov, and Gerald H. Jacobs (Indiana University, Dept. of Psychology, Bloomington, Ind.).
Optical Society of America, Journal, vol. 56, July 1966, p. 966-977. 12 refs.
U.S. Public Health Service Grant No. NB-02274; NSF Grant No. G-24125.

A detailed analysis was made of the response characteristics of single cells in the lateral geniculate nucleus of the macaque monkey. The goal was to understand how these cells contribute to the processing of visual information. Data were analyzed from a representative sample of 147 cells, whose responses to equal-energy spectra (presented as diffuse flashes of monochromatic light) were recorded at three radiance levels. On the basis of their responses, the cells were divided into two general classes: (1) spectrally nonopponent cells which respond to all wavelengths with either an increase or decrease in firing rate, (2) spectrally opponent cells (about two-thirds of the sample) which respond with an increase in firing rate to some parts of the spectrum and a decrease to other parts. Four types of opponent cells were found: (1) red excitatory and green inhibitory (+R - G), (2) green excitatory and red inhibitory (+G -R), (3) yellow excitatory and blue inhibitory + Y -B), (4) blue excitatory and yellow inhibitory (+B -Y). Comparisons with psychophysical data indicated that nonopponent cells transmit brightness information; opponent cells, however, carry information about color, the hue of a light being determined by the relative responses of the four types. The saturation of spectral lights appears to be related to the differences in responses of opponent and nonopponent cells. (Author)

A66-36947
BRIGHTNESS AND THE INCREMENT THRESHOLD.
Dwight A. Burkhardt (Brown University, Hunter Laboratory of Psychology, Providence, R.I.).
Optical Society of America, Journal, vol. 56, July 1966, p. 979-981. 14 refs.

Experiments on the behavior of the increment threshold of vision in two new situations. Two experiments were conducted and are described. They show that the relation between the increment threshold and brightness is relatively variable and complex; they thus provide further evidence that the increment threshold cannot be used as a reliable index of visual brightness. Heinemann has suggested that the critical factor determining the magnitude of the increment threshold is the rate of change of brightness with respect to the luminance increment and not the relative brightness level of the background field to which the luminance increment is added. The results of the experiments are compatible with this idea but they do not clearly identify the fundamental variables which presumably control the rate of brightness change and hence the magnitude of the increment threshold. M. F.

A66-36948
EFFECT OF STEP SIZE ON SENSITIVITY AS MEASURED BY THE METHOD OF CONSTANT STIMULUS DIFFERENCES.
Michael H. Siegel and Clare G. Holzman (U.S. Army, Chemical Research and Development Laboratories, Edgewood Arsenal, Md.).
Optical Society of America, Journal, vol. 56, July 1966, p. 981, 982. 18 refs.

Examination of the question of stimulus spacing in the method of constant stimulus differences. The results are graphed. The values found represent average standard deviations for the four observing sessions under each of three conditions. The first condition used a wavelength range narrower than the optimum. The second condition employed the optimal range for the observer. The third condition used a range broader than the optimum. Although the results reveal great individual differences of sensitivity among the three observers, a common trend has emerged. In every case, the second condition, in which response frequency ranged from about 10% to about 90%, gave the poorest level of discrimination. When the steps were either smaller than the optimal as in the first condition, or when they were larger, as in the third condition, measured sensitivity improved. The data show clearly that sensitivity is a function of stimulus spacing, although the relationship appears to be a complex one. M. F.

A66-36994 #
PSYCHOLOGICAL ASPECTS ON FLIGHT SAFETY.
Chaytor D. Mason (Southern California, University, Aerospace Safety Div., Los Angeles, Calif.).
IN: SWEDISH SOCIETY OF AERONAUTICS, INTERNATIONAL SYMPOSIUM ON CIVIL AVIATION SAFETY, STOCKHOLM, SWEDEN, APRIL 26-29, 1966, PROCEEDINGS. [A66-36990 20-02]
Stockholm, Swedish Society of Aeronautics, 1966, p. 87-98.

Discussion of man's deficiencies as a jet aircraft operator, leading to the conclusion that fully computerized, automated flight will ultimately become necessary. Various errors of the human senses and perceptions are considered in some detail, as well as factors that tend to aggravate these errors, such as fatigue, emotional stress, distractions, anoxia, and vertigo. F. R. L.

A66-36995 #
THE ASSESSMENT OF FLYING SKILLS IN RELATION TO ACCIDENT LIABILITY.
Alex Cassie (Ministry of Defence, London, England).
IN: SWEDISH SOCIETY OF AERONAUTICS, INTERNATIONAL SYMPOSIUM ON CIVIL AVIATION SAFETY, STOCKHOLM, SWEDEN, APRIL 26-29, 1966, PROCEEDINGS. [A66-36990 20-02]
Stockholm, Swedish Society of Aeronautics, 1966, p. 99-106.

Discussion of the possibility of being able to identify in advance the pilot who is likely, under certain circumstances, to have a flying accident. It is observed that there are small number of findings which tend to be confirmed from one study of accident proneness to another; from time to time unique and entirely unexpected associations are reported. A comprehensive study of a large group of pilots who had had accidents and a large control group which was accident free is reported in some detail. This study has been in operation over a period of 14 yr. F. R. L.

A66-36996 #
VISUAL PRESENTATION OF AIRCRAFT INFORMATION.
Rüdiger Seifert (Entwicklungsring Süd GmbH, Munich, West Germany).
IN: SWEDISH SOCIETY OF AERONAUTICS, INTERNATIONAL SYMPOSIUM ON CIVIL AVIATION SAFETY, STOCKHOLM, SWEDEN, APRIL 26-29, 1966, PROCEEDINGS. [A66-36990 20-02]
Stockholm, Swedish Society of Aeronautics, 1966, p. 113-126.

Use of visual displays as a means of aiding the pilot to fly the aircraft, and also to monitor and control the powerplant, the navigational and other equipment, and to communicate with ATC ground stations. Various displays are described and illustrated which can present information in such a way that the pilot needs less time to sense and identify the information. Such displays can also give distinct display-control relationships, so that the pilot needs less time to interpret the identified information, and can make a decision concerning the proper output required. Controls can be designed in such a way that the pilot needs less time and effort to actuate them. F. R. L.

A66-36997 #
A POSSIBILITY FOR REDUCING THE DANGEROUS VIBRATIONS EXPERIENCED BY PILOTS IN HEAVY TURBULENCE.
Sten Luthander and Vikram Kaul (Royal Institute of Technology, Stockholm, Sweden).
IN: SWEDISH SOCIETY OF AERONAUTICS, INTERNATIONAL SYMPOSIUM ON CIVIL AVIATION SAFETY, STOCKHOLM, SWEDEN, APRIL 26-29, 1966, PROCEEDINGS. [A66-36990 20-02]
Stockholm, Swedish Society of Aeronautics, 1966, p. 127-140. 9 refs.

Consideration of the problem of protecting the pilot from vibrations caused by atmospheric turbulence. The estimated aircraft vibration levels, expressed in an rms load factor, are given in relation to the stochastic model for atmospheric turbulence, and some differences in this respect between military and civil operations are mentioned. The human tolerance to vibration is discussed for comparison values and is also expressed in an rms load factor.

B. B.

A66-37007 #

ANALYSIS OF INCIDENT INFORMATION.

Carl G. Lager (Royal Swedish Air Force, Stockholm, Sweden).

IN: SWEDISH SOCIETY OF AERONAUTICS, INTERNATIONAL SYMPOSIUM ON CIVIL AVIATION SAFETY, STOCKHOLM, SWEDEN, APRIL 26-29, 1966, PROCEEDINGS. [A66-36990 20-02]
Stockholm, Swedish Society of Aeronautics, 1966, p. 347-356.

Investigation of Swedish aircraft incident (near accident) documentation and analysis. The periods of high accident rates which occur in the air forces are considered, and the prevention of multiple-malfunction accidents is discussed. The construction of a Link trainer test system for measuring variations in psychophysiological excitation caused by various normal in-flight tasks is evaluated.

B. B.

A66-37011

HUMAN SPATIAL ORIENTATION.

I. P. Howard and W. B. Templeton (Durham, University, Durham, England).

Research supported by the University of Durham.
London-New York, John Wiley and Sons, 1966. 533 p.
$13.50.

This book is about those aspects of human behavior which are determined by the angular position of the body (or head) in relation to any stable external reference system. Judgments of the inclination of lines to gravity (even though only external reference axes are directly involved) are considered because this topic is important for an understanding of body orientation behavior. Other topics, such as the discrimination and recognition of shapes, are discussed only insofar as the relevant behavior is affected by orientation variables. Geometrical illusions, figural aftereffects, and judgments of visual angle, length, distance, and movement are omitted. Particular topics covered include: the retina, eye movements, and visual direction; kinaesthesis; the vestibular apparatus; and auditory localization. Several chapters are devoted to orientation to gravity and to orientation and its relation to shape; sensorimotor and intersensory localization, the behavioral consequences of rotations and displacements of the optical array, and orientation in the weightless state are examined. An extensive bibliography and author index is included.

D. H.

A66-37052

A SCALE OF BIDIRECTIONAL SIMILARITY.

J. H. Brown (Virginia, University, Dept. of Psychology, Charlottesville, Va.).

Journal of General Psychology, vol. 74, 1966, p. 339-345. 5 refs.

Experimental investigation in which sets of ambiguous stimuli built around reversible figures were constructed, scaled, and validated. Positions on a continuum of bidirectional similarity were determined in terms of percent similarity to each of two referent prototypes, similarity being defined as the probability of eliciting either one of two responses. Variations of eight basic prototypes are constructed by systematically superimposing one prototype over another, and the scaling was done by 102 undergraduates. Stimulus selection was made on the basis of multiple criteria, and the resultant scales were validated by two groups of 18 subjects each.

M. L.

A66-37053

METHODS FOR COMPLETELY DECIPHERING THE NEURONAL CIRCUITRY OF BRAIN STRUCTURES.

William J. Fry (Illinois, University, Biophysical Research Laboratory, Urbana, Ill.).

INTERNATIONAL FEDERATION FOR MEDICAL ELECTRONICS, INTERNATIONAL CONFERENCE ON MEDICAL ELECTRONICS AND BIOLOGICAL ENGINEERING, 6TH, TOKYO, JAPAN, AUGUST 22-27, 1965, DIGEST, p. 278-283. 9 refs.
National Institutes of Health Grant No. B-1567; Grant No. NsG-195-62.

Description of methods and techniques for accurate determinations of neuron populations of structures in normal brains and of the same structures, after quasi-equilibrium is achieved, in brains of experimental animals modified by unambiguous lesion arrays. Such arrays provide the foundation for deciphering features of the neuronal circuitry that cannot be elucidated on the basis of qualitative neuroanatomical knowledge. Four approaches are discussed: use of internal brain landmarks as references for lesion placement; production of lesion arrays by precisely controlled, focused, intense ultrasound; improvements in methods of tissue preparation; and accurate cell population determinations. The examples given illustrate a general method of deriving basic features of neuronal circuitry from values of neuron population ratios computed from accurate population data. The relations obtained constitute a considerably more precise specification of the circuitry arrangements between groups of neurons than has been heretofore available.

M. L.

A66-37054

PHYSICAL PROPERTIES OF A DNA-DEPENDENT RNA POLYMERASE FROM ESCHERICHIA COLI.

A. J. Colvill, E. F. J. van Bruggen, and H. Fernández-Morán (Chicago, University, Dept. of Biophysics, Chicago, Ill.).

Journal of Molecular Biology, vol. 17, 1966, p. 302-304. 8 refs.
Research supported by the University of Chicago; U.S. Public Health Service Grant No. HD 01257; National Institutes of Health Grants No. NB-04267; No. GM-13243; AEC Contract No. AT (11-1)-1344; NSF Grant No. GB-2120; Grant No. NsG-441-63.

Investigation of the physical properties of DNA-dependent RNA polymerase known to be relatively free of nucleic acid and capable of asymmetric transcription. The RNA polymerase was found to have a sedimentation coefficient of 25s and an extinction ratio, A_{280}/A_{260}, of 1.63. The RNA synthesized on a template of native T_2 DNA with this enzyme showed an RNase resistance after self-annealing of 1.7% compared to 64% for RNA prepared on a template of denatured T_2 DNA. Electron micrographs of the DNA-dependent RNA polymerase, prepared by the Chamberlin and Berg method and by the procedure of Fuchs, are presented and discussed. The method of isolation of the enzyme, the preparation of the specimens for electron microscopy, and the technical aspects of micrograph taking are described.

M. M.

A66-37055

A METHOD FOR ANALYZING VARIATIONS IN EVOKED RESPONSES.

S. K. Burns (Massachusetts Institute of Technology, Research Laboratory of Electronics, Center for Communications Sciences, Cambridge, Mass.) and R. Melzack (McGill University, Dept. of Psychology, Montreal, Canada).

Electroencephalography and Clinical Neurophysiology, vol. 20, 1966, p. 407-409. 6 refs.
National Institutes of Health Grants No. MH-04737-05; No. MH-04235-03; NSF Grant No. GP-2495; ARPA Contract No. SD-193; Contract No. DA-36-039-AMC-03200(E); Grant No. NsG-496.

Demonstration that the usual assumption of an unchanging probability distribution, made to justify averaging, is not true in the EEG study of evoked potentials in awake animals, including man. In both the behaving animal and the sleeping human subject, large changes in the amplitude and wave shape of the evoked response occur in the time needed to obtain an average with a reasonably large SNR. This result points out the risk in inferring a casual relationship between a behavioral manipulation or observation and a change from one average to another in the amplitude or wave shape of the averaged evoked response.

M. M.

A66-37058
GLYCOGEN DEPLETION IN RAT VENTRICLES DURING GRADED EXERCISE.
James L. Poland and Don H. Blount (West Virginia, University, Dept. of Physiology, Medical Center, Morgantown, W. Va.).
Society for Experimental Biology and Medicine, Proceedings, vol. 121, 1966, p. 560-562. 5 refs.
U.S. Public Health Service Grant No. HE-06747; Grant No. NsG(T)-21.

Investigation relating myocardial glycogenolysis to the severity of exercise in the first 15 min of exercise of fasted male Sprague-Dawley rats. Trichloroacetic acid (TCA) soluble and residual glycogen fractions were determined in both ventricles. Glycogen depletion varied with the severity of the exercise and was produced almost exclusively in the TCA fraction. Left ventricular TCA glycogen was affected more than that of the right ventricle. M. L.

A66-37108
THE EFFECT OF THE SQUARE ROOT OF TIME ON CONTINUING PERCEPTUAL TASKS.
M. M. Taylor (Defence Research Board, Defence Research Medical Laboratories, Toronto, Canada).
(AGARD, Symposium on Natural and Artificial Logic Processors, Athens, Greece, July 1963, Paper.)
Perception and Psychophysics, vol. 1, 1966, p. 113-119. 20 refs.

Documentation of several types of change in the human perception of a stimulus pattern that itself does not change over time. It is observed that in spite of the fact that the pattern, or some aspect of it, does not change, the perception of the pattern by an observer does change - linearly with the square root of the observing time. Examples considered are drawn from studies of figural after-effects, motion after-effects, vigilance, motion neutralization, visibility of the stabilized retinal image, effects of contours on visibility, and fluctuations in the perceptual organization of ambiguous figures. It is not at all clear why the perceptual efficiency of the human organism should decrease linearly with the square root of time, although it makes adaptive sense. The consistency of the decline over so varied a range of perceptual tasks suggests that it is a fairly general property of natural information processing devices, at least in so adaptable a machine as the human. M. L.

A66-37236
A CRITICAL RE-EVALUATION OF THE HUMAN TRANSFER FUNCTION PROBLEM.
Arthur Kahn and Aleeza Cerf Beare (Westinghouse Electric Corp., Atomic, Defense and Space Group, Aerospace Div., Baltimore, Md.).
(Institute of Electrical and Electronics Engineers, Aerospace Systems Conference, Seattle, Wash., July 11-15, 1966, Paper.)
IEEE Transactions on Aerospace and Electronic Systems, Supplement, vol. AES-2, July 1966, p. 711-718. 11 refs.

Description of an approach to obtaining fundamental data which could be used to improve information handling and control by a human operator in a closed-loop tracking situation. An experiment was performed, using an analog computer, to develop the functional relationships that exist when the human operator is an integral part of the tracking loop in one dimension. The experimental design consisted of a 4x4x4x3x3x2 analysis of variance model in which the variables of frequency, amplitude, and stick sensitivity were systematically varied to yield 30 average rates of required stick motion. Four operators performed 288 trials, tracking sine waves with and without the presence of noise. A total of 1152 data readings were subjected to an analysis of variance performed on a digital computer. The analysis yielded detailed information on operator error and gain. M. M.

A66-37253
INTRODUCTION TO ENVIRONMENTAL PHYSIOLOGY.
G. E. Folk, Jr. (Iowa, University, Dept. of Physiology, Iowa City, Iowa).
Research supported by the National Science Foundation and the Iowa Mental Health Fund.
Philadelphia, Lea and Febiger, 1966. 308 p.
$12.

A treatise on environmental physiology is offered to graduate students in science who have studied the fundamentals of mammalian physiology. The book is primarily concerned with the physiological responses of healthy mammals to natural changes or extremes of the physical environment. The factors of heat, cold, light, atmospheric pressure, the water environment, and subtle environmental factors are considered, and the fundamental physiological reactions of mammals to these environmental extremes are listed. Most chapters begin with environmental diagrams and also some appropriate condensed physiological information, both intended for quick reference to particular values. Appendices contain references of several types to encourage the student of environmental physiology to familiarize himself with the literature and ideas of a related discipline. M. M.

A66-37305
INTELLIGENCE IN THE UNIVERSE.
R. A. MacGowan (U.S. Army, Missile Command, Computation Center, Scientific Digital Branch, Huntsville, Ala.) and F. I. Ordway, III (General Astronautics Research Corp., London, England).
Englewood Cliffs, N.J., Prentice-Hall, Inc., 1966. 402 p.
$13.50.

This book provides a comprehensive analysis of the possibility of extrasolar intelligence (intelligence existing beyond the confines of the solar system) and includes a review of the origin of planetary systems, the origin and development of life, and the course of terrestrial biological evolution. Particular attention is drawn to the chapters on biological and mechanical thinking processes and the social implications of extrasolar intelligence. The development of intelligent artificial automata are considered, and the probable characteristics and capabilities of extrasolar intelligence are discussed. The possibility of communications with extrasolar intelligence by laser beam, galactic communication networks, and interstellar flight are analyzed. The probable prevalence of solar-type intelligence is hypothesized in the light of the available data and original interpretations of established facts. D. P. F.

A66-37365
EFFECT OF ALTITUDE ON OXYGEN CONSUMPTION OF DEER MICE - RELATION OF TEMPERATURE AND SEASON.
Raymond J. Hock (California, University, White Mountain Research Station, Bishop, Calif.) and Jane C. Roberts (California, University, Dept. of Physiology, Los Angeles, Calif.).
Canadian Journal of Zoology, vol. 44, 1966, p. 365-376. 23 refs.
U.S. Public Health Service Grant No. GM-09261; Grant No. NsG-721.

Metabolic rates of deer mice, P. maniculatus sonoriensis, native to and studied at sea level, 1220 m, and 3800 m, were measured at a number of ambient temperatures between 0 and 37°C. In summer (May-August) there was a direct relationship between metabolic rate and pO_2 at all ambient temperatures. When metabolic rates were measured in fall (October-November) at 20 and 32°C, the MR's of mice from sea level and 3800 m were nearly identical. It is concluded that seasonal changes in MR differ markedly with altitude. At sea level the response to seasonal cold appears ascribable to an increase in physiological insulation. At 3800 m, where summer MR is low, the response to seasonal cold is a metabolic one, that is, an increase in metabolic rate with no change in body temperature. There appears to be no clear-cut relationship between body temperature and altitude and a number of factors other than hypoxia undoubtedly influence not only body temperature, but also thermoregulatory ability of mice from different altitudes. (Author)

A66-37601
OPERANT CONDITIONING OF SINGLE UNIT RESPONSES.
J. Olds (Michigan, University, Dept. of Psychology, Ann Arbor, Mich.).
(International Congress of Physiological Sciences, 23rd, Tokyo, Japan, Sept. 1-9, 1965, Paper.)
Excerpta Medica International Congress Series, no. 87, 1965, p. 372-380.
Grant No. NsG-626.

Report of a method for identifying neural processes which are manipulable by means of operant reinforcement. The overall purpose of the study is to determine the anatomical areas and the electric signs of the reinforcement process. Action potential sequences in the hippocampus and in the midbrain tegmentum which have been successfully conditioned by operant techniques are reported, and details are given of the methods which were evolved for the purpose. M. L.

A66-37602

DISSOCIATION OF SELF-STIMULATION AND EPILEPTIFORM ACTIVITY.

J. Bogacz, J. St. Laurent, and J. Olds (Michigan, University, Dept. of Psychology, Brain Research Laboratory, Ann Arbor, Mich.).

Electroencephalography and Clinical Neurophysiology, vol. 19, 1965, p. 75-87. 11 refs.

Research supported by the U. S. Public Health Service and NSF; Grant No. NsG-626.

Investigation of the relationship between rhinencephalic and thalamic self-stimulation and epileptiform activity. The purpose was to determine if self-stimulation would produce epileptiform activity, and if there is a correlation between after-discharges or seizures and self-stimulation. No significant relation could be demonstrated between self-stimulation and epileptiform activity, at least judging from the higher threshold values for the epileptiform discharges or from their duration and generalization which were not enhanced when induced in optimal sites for self-stimulation. Mapping with respect to epileptiform activity also yielded quite a different picture from that of self-stimulation. Epileptiform activity was found to be minimal when probes in the midbrain were stimulated and maximal with probes nearer to the cortex. The ventrolateral tegmentum, which is the optimal area for eliciting the self-stimulation behavior, appears to be refractory to epileptiform activity. M. L.

A66-37603

THE INDUCTION AND SUPPRESSION OF HYPOTHALAMIC SELF-STIMULATION BEHAVIOR BY MICRO-INJECTION OF ENDOGENOUS SUBSTANCES AT THE SELF-STIMULATION SITE.

J. Olds (Michigan, University, Dept. of Psychology, Ann Arbor, Mich.).

(International Congress of Endocrinology, 2nd, London, England, Aug. 17-22, 1964, Paper.)

Excerpta Medica International Congress Series, no. 83, 1964, p. 597-605. 14 refs.

Grant No. NsG-626.

Investigation showing that carbamylcholine, testosterone sulfate, and a number of substances which precipitate or chelate calcium produce excitatory activity when applied to the hypothalamic area where electric stimulation has an effect on operant behavior tantamount to primary reward. The study brings out three points suggesting specificity and one point suggesting a generality of the testosterone effect. Specificity of testosterone action is suggested by the fact that (1) testosterone sulfate causes much higher excitation levels than carbamylcholine, (2) testosterone in "drive-behavior" experiments is reported to elicit sexual behavior (but not drinking behavior) while carbamylcholine produces only drinking behavior, and (3) remarkably small concentrations of testosterone are required to elicit hypothalamic behavior. An observation suggesting a generality of the stimulating action of testosterone is reported in the study; in preliminary experiments, testosterone produced eating behavior more often than it did sexual behavior. M. L.

A66-37604

COMPREHENSIVE SPECTRAL ANALYSIS OF HUMAN EEG GENERATORS IN POSTERIOR CEREBRAL REGIONS.

D. O. Walter, J. M. Rhodes, D. Brown, and W. R. Adey (California, University, Dept. of Physiology, Dept. of Anatomy, and Center for Health Sciences, Brain Research Institute, Los Angeles, Calif.).

Electroencephalography and Clinical Neurophysiology, vol. 20, 1966, p. 224-237. 14 refs.

U. S. Public Health Service Grant No. NB-2501-04; Grants No. AF AFOSR 246-63; No. NsG-505; Contract No. NAS 9-1970.

Investigation of some aspects of intracerebral electrical generation by means of a novel extension of spectral analysis, which consists in performing many sequential spectral analyses and producing suggestive visual transformations of spectral intensity and strength of spectral relationship, as a function of both time and frequency. Parameters graphed were spectral intensity ("power spectral density") and coherence (a quantity expressing strength of relationship between brain areas). Collection and computer processing of the data are detailed, in which contour maps and density plots are produced which give a broad overview of the stability, fluctuation, and propagation in the electroencephalogram (EEG), which in turn leads to a broadened conception of the familiar alpha wave, as well as to clear delineation of linear and nonlinear transmission. Mathematical constraints implied by the common finding of two perpendicular alpha-band generators are presented. M. L.

A66-37607

THE EFFECTS OF COMBINED RENAL VASODILATATION AND PRESSOR AGENTS ON RENAL HEMODYNAMICS AND THE TUBULAR REABSORPTION OF SODIUM.

Laurence E. Earley and Robert M. Friedler (Harvard University, Medical School, Dept. of Medicine and Thorndike Memorial Laboratory, Boston, Mass.).

Journal of Clinical Investigation, vol. 45, no. 4, 1966, p. 542-551. 25 refs.

National Institutes of Health Grant No. AM-5401-04; Grant No. NsG-595.

Study of the combined effects of unilateral renal vasodilatation and angiotensin infusion on renal hemodynamics and excretion and reabsorption of sodium in anesthetized, hydropenic dogs. Unilateral renal vasodilatation alone with either acetylcholine, bradykinin, or kallidin caused an ipsilateral increase in renal plasma flow and an ipsilateral decrease in net tubular reabsorption of sodium. The infusion of angiotensin or norepinephrine in the presence of unilateral renal vasodilatation resulted in a sustained and marked increase in sodium excretion and decreased sodium reabsorption. These changes occurred in association with decreases in glomerular filtration rate, clearance of p-aminohippurate, renal plasma flow, and "noncortical" plasma flow. Results are consistent with the view that proper combination of two physiologically important variables, arterial pressure and renal vascular resistance, can effect large changes in the tubular reabsorption of sodium, probably through intrarenal mechanisms. Changes in these two variables are considered of major importance in the regulation of sodium excretion. M. L.

A66-37791

RESPONSES OF HETEROTROPHIC CULTURES OF CHLORELLA VULGARIS BEYERINCK TO DARKNESS AND LIGHT. I - PIGMENT AND pH CHANGES.

Edward P. Karlander and Robert W. Krauss (Maryland, University, Dept. of Botany, College Park, Md.).

Plant Physiology, vol. 41, Jan. 1966, p. 1-6. 24 refs.

Grant No. NsG-70-60.

Glucose cultures of Chlorella vulgaris were grown in white light, in monochromatic light, and in darkness. Difference spectra showed that all wavelengths resulted in increased pigmentation over the dark controls. Cells irradiated with the 600 mμ beam showed a much higher absorption in the blue end of the spectrum with respect to the red end than is normally found in absorption spectra of white-light grown Chlorella cells. Dry weight comparisons between monochromatic light and dark controls showed the controls to be somewhat higher. This demonstrated that the monochromatic irradiation produced pigment synthesis but no increase in growth. Dark growth experiments suggested that cultures incubated in darkness on glucose excreted an acidic product. (Author)

A66-37792

RESPONSES OF HETEROTROPHIC CULTURES OF CHLORELLA VULGARIS BEYERINCK TO DARKNESS AND LIGHT. II - ACTION SPECTRUM FOR AND MECHANISM OF THE LIGHT REQUIREMENT FOR HETEROTROPHIC GROWTH.

Edward P. Karlander and Robert W. Krauss (Maryland, University, Dept. of Botany, College Park, Md.).

Plant Physiology, vol. 41, Jan. 1966, p. 7-14. 19 refs.

Grant No. NsG-70-60.

Study of the effect of illumination on the growth of Chlorella vulgaris. The growth rate of plants in darkness on a glucose medium remained constant for 2 days and then dropped sharply to approach zero. The pigment concentration also declined in darkness. An air flow with 1% CO_2, passed at rates up to 7 ml/min, produced a progressive increase in the dark growth rate for a 5-day period but did not maintain further growth without light. The effect of variations in the intensity of white light on the growth, pigmentation and glucose intake by the plant is discussed. Also the inhibitory effect of malonate and cyanide on the growth of the plant is investigated.
V. Z.

A66-37893 #
A METHODOLOGY TO ANALYZE AND EVALUATE CRITICAL HUMAN PERFORMANCE.
M. A. Barone (Brown Engineering Co., Inc., Human Factors Branch, Special Programs Section, Huntsville, Ala.).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY. VOLUME 5 - ACHIEVING SYSTEM EFFECTIVENESS; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 5TH, NEW YORK, N.Y., JULY 18-20, 1965, PAPERS. [A66-37879 20-15]
Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.
New York, American Institute of Aeronautics and Astronautics, 1966, p. 116-122.

Presented in this paper is a methodology to evaluate, analyze, and predict critical human performance. The methodology is a novel approach towards evaluating potential human error. The aim of the Critical Human Performance and Evaluation (CHPAE) Program is to develop a methodology to control and minimize the natural subjectivity associated with evaluation programs. The typical approach of the CHPAE Program is: (1) analyze the system or task, (2) select evaluation factors, (3) establish and prevalidate a rating manual of check list, (4) perform an analysis and evaluation, (5) estimate potential error probabilities, and (6) perform critical comparison studies. Much work still remains to be done towards a complete and final validation of the program - partly because there is a variety of methods both computerized and manual that can be applied to quantify the evaluations and partly because of the need of large population statistics, other than experimental or selected source data to validate the error potential prediction of the plan. Regardless of the early limitations of the metric, the plan will perform a valuable human factors evaluation of a group of tasks, subsystems or systems. (Author)

A66-37894 #
HUMAN FACTORS AND SYSTEMS EFFECTIVENESS.
Donald A. Topmiller (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Systems Research Branch, Wright-Patterson AFB, Ohio).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY. VOLUME 5 - ACHIEVING SYSTEM EFFECTIVENESS; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 5TH, NEW YORK, N.Y., JULY 18-20, 1965, PAPERS. [A66-37879 20-15]
Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.
New York, American Institute of Aeronautics and Astronautics, 1966, p. 123-132. 6 refs.

Treatment of human factors in systems effectiveness as a basic problem relating human performance to the major systems effectiveness parameters of operability, reliability, and maintainability. It is shown that the latter two parameters are topologically related to the primary dependent human performance variables used in laboratory research of errors and time, respectively. A regression analysis approach is recommended for evaluating the potential operational maintainability during the development stage, since the regression equation can be appropriately corrected for sampling bias incurred in its initial development. Two studies are reviewed in which human performance is predicted on the basis of design evaluations and analysis of equipment. A. B. K.

A66-37895 #
HUMAN RELIABILITY IN THE OPERATION OF V/STOL AIRCRAFT.
Richard N. de Callies (North American Aviation, Inc., Los Angeles Div., Life Sciences Group, Los Angeles, Calif.).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY. VOLUME 5 - ACHIEVING SYSTEM EFFECTIVENESS; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 5TH, NEW YORK, N.Y., JULY 18-20, 1965, PAPERS. [A66-37879 20-15]
Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.
New York, American Institute of Aeronautics and Astronautics, 1966, p. 133-145. 24 refs.
Contract No. AF 33(615)-2400.

Study of V/STOL requirements for displays and controls for several modes of operation, including hover and transition, low-altitude high-speed, and all-weather conditions. Display concepts such as "head-up" and the "contact analog" are examined for their capability in maintaining response constancy. The results of tests using a "workspace analyzer" to investigate cockpit subsystem parameters are cited. A. B. K.

A66-38029
SOME RECENT WORK ON PREBIOLOGICAL SYNTHESIS OF ORGANIC COMPOUNDS.
Cyril Ponnamperuma (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Icarus, vol. 5, July 1966, p. 450-454. 23 refs.

The experimental approach to the question of the origin of life is based on the Oparin-Haldane hypothesis that life is a special property of matter which arose at a particular period in the existence of our planet and resulted from its orderly development. The simple working hypothesis has been adopted that the molecules which are important now were important at the time of the origin of life. Starting with the earth's primordial atmosphere and the various forms of energy which may have existed at the time, we are endeavoring to retrace the origin of the constituents of the nucleic acid and protein molecules. Current results indicate that many of the biological molecules can be synthesized under conditions which may be considered to be genuinely similar to those which prevailed on the prebiotic earth. (Author)

A66-38053
AFTERIMAGE FUSION IN VISUAL OBSERVATIONS.
Thomas Behrendt (Jefferson Medical College, Dept. of Ophthalmology, Philadelphia, Pa.).
Astronomical Society of the Pacific, Publications, vol. 78, June 1966, p. 258-260. 6 refs.
National Institutes of Health Grant No. NB-5456-01.

Discussion of evidence that psychophysiological fusion, which links the afterimages of separate visual stimuli, may cause artifacts in visual astronomical observations. Several experiments are considered, demonstrating that under certain conditions the afterimages may be seen to extend further than the originally stimulated retinal area. B. B.

A66-38099
VARIATION OF CHROMATIC TONALITY WITH THE TIME INTERVAL OF PERCEPTION IN FOVEAL VISION UNDER EQUAL LUMINOSITY [VARIATION DE LA TONALITE CHROMATIQUE AVEC LA DUREE DE PERCEPTION, EN VISION FOVEALE, A EGALITE DE LUMINANCE].
Michel Benaim (Alger, Université, Laboratoire de Biophysique, Algiers, Algeria).
Académie des Sciences (Paris), Comptes Rendus, Série D - Sciences Naturelles, vol. 263, no. 2, July 11, 1966, p. 156, 157. In French.

Experimental demonstration that the tone quality varies as a function of the time interval of perception. A modified Pulfrich-type photometer with an eyepiece incorporating a Balzer 40 interference filter was used. The tone quality of a semicircular image screen illuminated by a flash is compared with that of a semicircular image screen illuminated by a constant light source. The experimental arrangement is described and the luminosity variations for each

shade and color are listed. It was found that the shifts in tone quality brought about by short perception intervals are as follows: red to yellow, green to yellowish green, orange yellow to yellow, and blue to greenish blue. D. P. F.

A66-38100
EFFECT OF THE DYNAMIC BEHAVIOR OF A MUSCLE ON ITS ACTIVITY STATE [INFLUENCE DU COMPORTEMENT DYNAMIQUE D'UN MUSCLE SUR SON ETAT D'ACTIVITE].
Jacques Richalet and Roger Pouliquen (Ecole Nationale Supérieure de l'Aéronautique, Centre d'Etudes et de Recherches en Automatisme, Vélizy-Villacoublay, Seine-et-Oise, France).
Académie des Sciences (Paris), Comptes Rendus, Série D - Sciences Naturelles, vol. 263, no. 2, July 11, 1966, p. 187-190. In French.
Research supported by the Direction des Recherches et Moyens d'Essais.

Description of a model, which considers the effect of muscle contraction and the force developed on the state of muscle activity, in terms of the dynamic characteristics of muscle expressed as force-velocity curves. It is found that in accordance with Hill's ratio, which relates the velocity of contraction of a muscle to the weight displaced, this velocity is not constant and only has physical significance for the maximum value obtained. The dynamics of contraction are used to connect the mechanical and the energy theories; one of the parameters defining the model covers the energy relationships. Hill's force-velocity curves are constructed on the basis of a dynamic model. It was found that the state of activity increases when the muscle undergoes contraction or when the force developed increases. D. P. F.

A66-38162 #
THERMAL STERILIZATION OF SPACECRAFT STRUCTURES.
John B. Tenney (General Electric Co., Missile and Space Div., King of Prussia, Pa.), Erwin Fried (General Electric Co., Missile and Space Div., Spacecraft Dept., King of Prussia, Pa.), and R. G. Crawford (NASA, Marshall Space Flight Center, Propulsion and Vehicle Engineering Laboratory, Structures Div., Structural Research Unit, Huntsville, Ala.).
(AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, UNMANNED SPACECRAFT MEETING, LOS ANGELES, CALIF., MARCH 1-4, 1965. AIAA Publication CP-12, p. 43-59.)
Journal of Spacecraft and Rockets, vol. 3, Aug. 1966, p. 1239-1244.
Contract No. NAS 8-11107.

A66-38163 #
RADIATION DOSIMETRY ABOARD MANNED SPACE VEHICLES.
Norman A. Baily (Hughes Aircraft Co., Research Laboratories, Space Sciences Dept., Malibu, Calif.) and Charles A. Sondhaus (California College of Medicine, Los Angeles, Calif.).
(AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS, p. 318-325.)
Journal of Spacecraft and Rockets, vol. 3, Aug. 1966, p. 1245-1251. 14 refs.

A66-38164 #
WATER-COOLED SPACE SUIT.
David C. Jennings (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).
Journal of Spacecraft and Rockets, vol. 3, Aug. 1966, p. 1251-1256. 7 refs.
Contracts No. NAS 9-723; No. NAS 9-3535.

Water was circulated as a heat transport fluid for space suit cooling as an improvement over cooling by ventilation. Ventilation cools by displacement of water vapor containing latent heat from perspiration. Water has the advantage of a much larger heat capacity than an equal volume of water vapor over the same temperature difference. This fact makes heat removal from a space suit possible at significant savings in weight and power. A series of experiments was performed on men working in liquid cooled garments. These garments were of a type that utilized conductive cooling of the skin by direct contact, and heat transport by circulating water. Feasibility of the concept was demonstrated and pertinent design factors were identified. A major benefit was gained in the suppression of sweating while maintaining comfort. The consequent reduction of body moisture loss is important for long missions at high activity. The results show a cooling capacity able to maintain body temperature equilibrium at metabolic rates in excess of 2000 Btu/hr with comfort. Moisture loss from sweating has been held to 100 cm^3/hr at 1600 Btu/hr in an insulated environment during treadmill testing. Body temperature was independent of water temperature and flow rate over broad ranges of physical activity. (Author)

A66-38172 #
A PROTOTYPE TWO-GAS REGENERATIVE LIFE SUPPORT SYSTEM FOR ADVANCED SPACE MISSIONS.
J. M. Smith and T. M. Olcott (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
(American Institute of Aeronautics and Astronautics, Annual Meeting, 2nd, San Francisco, Calif., July 26-29, 1965, Paper 65-501.)
Journal of Spacecraft and Rockets, vol. 3, Aug. 1966, p. 1294-1296.

A66-38418
QUANTITATIVE RADIOMETRIC MEASUREMENT OF SKIN TEMPERATURE.
W. C. Kaufman and James C. Pittman, Jr. (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Biomedical Laboratory, Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 21, Jan. 1966, p. 302-304. 7 refs.

Although infrared thermograms have been employed for assessing skin temperatures for some time, precise quantitative measurements have been lacking. A simple radiometer has been constructed and a method devised by which the surface temperature of the forearm and hand can be precisely measured. The instrument has a precision of ±0.1°C. Measurements show the variation of the front surface of the forearm in neutral thermal conditions to be, at extremes, +1.7°C and -2.3°C from the mean. Temperature patterns vary to some degree when the hand is heated or cooled. The magnitude of the variations is essentially unchanged during heating but is approximately doubled during cooling. (Author)

A66-38419
A DEVICE FOR THE PARTIAL RESTRAINT OF RATS IN OPERANT CONDITIONING STUDIES.
Robert D. Hall, Richard J. Clayton, and Roger G. Mark (Massachusetts Institute of Technology, Cambridge, Mass.).
Journal of the Experimental Analysis of Behavior, vol. 9, Mar. 1966, p. 143-145. 9 refs.
National Institutes of Health Grant No. MH-04737; NSF Grant No. 2495; Contract No. DA-36-039-AMC-03200(E); Grant No. NsG-496.

Description of an apparatus for restraining rats during studies of operant conditioning. The device, which is illustrated, allows only the head and one foreleg of the rat freedom of movement. Furthermore, the device is of simple and rigid construction; it allows easy insertion of the animals, long-term use, excellent control of operant behavior. Most of the animal's body, especially the head, is accessible. M. L.

LC ENTRIES

A66-81870
RADIOCALCIUM ABSORPTION AT DIFFERENT TIMES OF DAY.
Joseph Samachson, Josephine Scheck, and Herta Spencer (Veterans Admin. Hosp., Metab. Sect., Hines, Ill.)
American Journal of Clinical Nutrition, vol. 18, Jun. 1966, p. 449–451. 8 refs.
Grant NIAMD A-5572 and Natl. Dairy Council supported research.

In order to determine whether the absorption of calcium differed at different times of the day, tracer doses of Ca^{47} were administered orally with the morning and evening meal, in separate studies, to male patients who were maintained on a constant dietary intake. The tracer dose was given to two patients on a low calcium intake, two on a medium calcium intake and two on a high calcium intake. The variability of absorption from morning to evening doses with any level of calcium intake was about equal to the variability of repeated morning doses ingested on different days, and the absorption of calcium was not consistently greater at either time of day. It therefore appeared that the ingestion of radiocalcium with a single meal reflected with reasonable accuracy the absorption of calcium during the day.

A66-81871
CARDIAC RESPONSE TIME OF X-15 PILOTS: A CROSS-CORRELATION ANALYSIS.
John W. Brant (Portland State Coll., Ore.) and Kenneth J. Love (I.B.M. Corp., Portland, Ore.)
Life Sciences, vol. 5, May 1966, p. 875–882. 8 refs.

Respiration and heart rates of an X-15 rocket plane pilot were investigated. The study shows that significant cross-correlations do exist between respiration rate and heart rate. The response times are variable and both the degree of correlation and the length of response time can be meaningfully related to environmental factors. In the initial "restful" phases, the correlations were high; they vanished as stress increased, and reappeared in the later "fatigue" phases, when the response times were found to be of maximum length. The correlations were also very high in phases of sustained stress. This suggests that more complex procedures developed for the analysis of dynamic industrial processes, e.g., frequency response analysis, spectral analysis, and zeta transforms, might be very profitably applied to the study of biological systems in experiments outside the traditional laboratory. Perhaps the most significant finding is that the correlations exist between two simple variables in what is known to be a complex multivariable system.

A66-81872
OMNI-SONIC FLIGHT AND THE SELECTION OF IMPORTANTLY RELATED MAN–MACHINE-ENVIRONMENT PARAMETERS.
John W. A. Brant (Portland State Coll., Ore.), Kenneth J. Love (I.B.M. Corp., Portland, Ore.), and Charles T. Hage (Eastman Kodak Co., Rochester, N. Y.)
(Human Factors Subcomm. of Electron. Ind. Assn., Albuquerque, N. Mex., Aug. 17–19, 1964).
Life Sciences, vol. 5, May 1966, p. 883–889. 15 refs.
Med. Res. Found., Ore. supported research.

The statistical method of regression and correlation was applied to assess the relationships among 21 selected man–machine-environment parameters during omnisonic (including subsonic, transsonic, and supersonic ranges of speed) flights in general and during X-15 flights in particular. It is demonstrated that: (1) the system of independent variables explains significantly variation in instantaneous heart acceleration, whereas, from 2–6 individual variables closely relate, on an individual basis, to instantaneous heart acceleration within the system; (2) for prediction, 9–10 or about half the 20 individual variables provide a best predictive equation—not always the same 9–10 variables, however; (3) in the system variables, considering the most significantly related independent variable to the dependent variable, the type of flight is indicated, e.g., in Flight 1 cockpit skin temperature indicates a heat flight, in Flight 2 longitudinal acceleration at C. G., a speed flight, and in Flight 3 altitude, an altitude flight; and (4) instantaneous heart acceleration is an excellent reflector of the pilot's emotional response to the flight situation. The major aerodynamic parameters, i.e., heat, speed, altitude, of each of three engineering flight profiles predicts significantly variation in instantaneous heart acceleration.

A66-81873
A NOTE ON CONJOINT MEASUREMENT AND BROWN'S HYPOTHESIS OF VELOCITY PERCEPTION.
Lennart Sjöberg.
Reports from the Psychological Laboratories, University of Stockholm, no. 194, Jun. 1965, p. 1–4.

It is proposed that Brown's hypothesis, according to which subjective velocity is proportional to the ratio between apparent distance traveled and subjective time, be tested with conjoint measurement. A re-analysis of some published data on time estimation suggests that the hypothesis may well be expected to give a good approximation to data.

A66-81874
A DEVELOPMENTAL STUDY OF THE EFFECTS OF VISUAL AND AUDITORY INTERFERENCE ON A VISUAL SCANNING TASK.
Eleanor J. Gibson and Albert Yonas (Cornell U., Ithaca, N. Y.)
Psychonomic Science, vol. 5, Jun. 5, 1966, p. 163–164. 5 refs.
Grants PHS MH-07226-02 and OE6-10-156.

The effects of visual and auditory interference on a visual scanning task were compared with children from the third grade and college sophomores. A highly confusable visual context significantly reduced scanning rate for both children and adults, but a highly confusable auditory context, played over earphones, had no effect on either group. There was a significant age interaction with interfering visual context. It seems likely that theories assuming auditory encoding of visually presented graphic items have little predictive value for a scanning task.

A66-81875
DIRECTIONAL ASYMMETRY OF MOTION AFTEREFFECT.
Thomas R. Scott, Abraham D. Lavender, Ronald A. McWhirt, and Donnie A. Powell (Veterans Admin. Hosp., Columbia, S. C.)
Journal of Experimental Psychology, vol. 71, Jun. 1966, p. 806–815. 15 refs.

It is well known that in spiral aftereffect, apparent centrifugal motion is greater than apparent centripetal motion. It has recently been proposed that this asymmetry results from differential eye movements during the inspection period. Centrifugal and centripetal aftereffects were measured concurrently

with eye movements. The postulated differential in eye movements was not found. The asymmetry was found to be presented in waterfall illusion as well as in spiral aftereffect with the degree of asymmetry increasing as a function of distance from the fovea out to about 20°. Prolonged exposure to spirals rotating in both directions over a period of four days brought about a significant reduction in the amount of asymmetry suggesting that this phenomenon may be a result of environmental adaptation.

A66-81876
VISUAL DETECTION OF COMPOUND MOTION.
L. T. Alexander and A. S. Cooperband (System Develop. Corp., Santa Monica, Calif.)
(Western Psychol. Assn., Honolulu, Jun. 14–19, 1965).
Journal of Experimental Psychology, vol. 71, Jun. 1966, p. 816–821. 8 refs.

Results of previous studies suggest that under certain geometric conditions the rate of change of the relative bearing (ω) between two moving objects is used as a cue to predict their future positions in space. Four subjects were studied in four situations representing an abstraction of these geometric conditions. Their task was to detect a rotary motion superimposed on translational motion. The results indicate that ω was the primary cue used in this task; detection performance was a linear function of ω.

A66-81877
EFFECT OF REGIONAL HYPOXIA ON THE DISTRIBUTION OF PULMONARY BLOOD FLOW IN MAN.
Vincent Lopez-Majano, Henry N. Wagner, Jr., Ralph H. Twining, Donald E. Tow, and Victor Chernick (Veterans Admin. Hosp., Med. Serv. and Johns Hopkins Med. Institution, Baltimore, Md.)
Circulation Research, vol. 18, May 1966, p. 550–557. 15 refs. Grants PHS HD-00281-06 and GM 10548-02.

In ten patients with chronic lung disease unilateral airway hypoxia was produced by having them breathe 100% nitrogen administered for seven minutes via a Carlens catheter while the other lung received 100% oxygen. The partition of pulmonary arterial blood flow between the two lungs was determined by radioisotope scanning following intravenous injection of I^{131} macroaggregated human serum albumin (MAA) both during bilateral air breathing and unilateral hypoxia. Unilateral hypoxia produced a 42% decrease in pulmonary blood flow to the hypoxic lung due to ipsilateral vasoconstriction. The response to N_2 was greater when given to the diseased lung, suggesting that the pulmonary vascular bed of the involved lung was incapable of accepting a large increase in the proportion of the cardiac output because the vascular bed was already compromised by disease. Ventilation on the hypoxic side increased by 1.4 liters/min. while there was no change on the side receiving 100% oxygen. Since unilateral hypoxia produced both a decreased blood flow and an increased ventilation, it is suggested that the lung is capable of altering regional perfusion and ventilation in a manner ideally suited to minimize the change in alveolar and pulmonary capillary oxygen tension.

A66-81878
CARDIOVASCULAR RESPONSE TO EPINEPHRINE DURING ACUTE HYPERCAPNIA IN DOGS: EFFECTS OF AUTONOMIC BLOCKING DRUGS.
Emmett Steadman Manley, Jr., Robert Arthur Woodbury, and Clinton B. Nash (Tenn. U., Med. Units, Dept. of Pharmacol., Memphis).
(Federation of Am. Soc. for Exptl. Biol., Chicago, Apr. 1964).
Circulation Research, vol. 18, May 1966, p. 573–584. 25 refs. Grant AHA 61-G-70 A63.638.

The reduction of cardiovascular responsiveness to epinephrine which develops during hypercapnia was investigated in the pentobarbital-anesthetized dog. Hypercapnia was induced by ventilation with either 15 or 30% carbon dioxide for a constant interval (either two or ten minutes) before administration of epinephrine. The chronotropic, pressor, and inotropic responses to epinephrine were reduced in that order by hypercapnia. These responses were reduced both in amplitude and duration. Phentolamine enhanced the cardiac blocking activity of carbon dioxide. The depressor response to epinephrine, following phentolamine, were found to be exquisitely sensitive to elimination by hypercapnia. Cardiac stimulatory responses elicited by acetylcholine in atropinized dogs were not reduced by the intensity of hypercapnia employed in this study. The degree of refractoriness to epinephrine produced by high concentrations of CO_2 was less in those animals which had been exposed previously to high concentrations of carbon dioxide. Arterial blood pH determinations were found to be misleading when employed as an index of epinephrine responsiveness. Reduction of available catecholamine stores by reserpine, adrenalectomy, or P-286 reduced the pressor refractoriness. Ganglionic blockade was largely ineffective in this respect as was parasympathetic blockade with atropine.

A66-81879
RECOGNITION OF SIGNAL COLORS BY A DIFFERENT SET OF COLOR NAMES.
S. R. Das (Natl. Phys. Lab., New Delhi, India).
Journal of the Optical Society of America, vol. 56, Jun. 1966, p. 789–794. 9 refs.

Recognition of signal colors was studied by statistics of use of names of red, yellow, green, blue, and difficult, over a wide-range of illuminance. Results were compared with those obtained by other authors. The absence of "white" and inclusion of "difficult" in the permissible responses appear to be responsible for difficulties in the blue and yellow recognition. In general, recognition response was found to be a function of both saturation and luminance of the signal.

A66-81880
POSITIVE AFTERIMAGE FOLLOWING BRIEF HIGH-INTENSITY FLASHES.
Norma D. Miller (Ohio State U., School of Optometry, Columbus).
Journal of the Optical Society of America, vol. 56, Jun. 1966, p. 802–806. 9 refs.
USAF supported research.

The time course of the decay of the positive afterimage following high-intensity flashes was measured by monocular and binocular brightness matching. The comparison field luminance was adjusted by means of crossed neutral wedges driven by a reversible motor. Density of the wedges was continuously recorded and the afterimage was tracked up to seven minutes following the flashes. Flash durations of 0.24 to 1.4 msec. were used with a flash luminance of 4×10^5 L. With a 10° monocular bipartite photometric field, the afterimage brightness five sec. following a 3×10^7 td. sec. flash was matched by a 10^5-td. comparison field. Photometric matches

made monocularly or binocularly with an annular afterimage, 10° o.d. and 5° i.d., concentric with a 2° centrally fixated comparison field required approximately 10^4 td. A 2° central afterimage matched with an annular comparison field showed no significant difference from the annular afterimage. The results for the first two minutes following the flashes for all conditions showed a linear relationship between the logarithm of the comparison field luminance and the logarithm of the time measured from the flash.

A66-81881
LOCUS OF PERCEIVED EQUIDISTANCE AS A FUNCTION OF VIEWING DISTANCE.
John M. Foley (Calif. U., Santa Barbara).
Journal of the Optical Society of America, vol. 56, Jun. 1966, p. 822–827. 12 refs.
Grant NIMH MH 08878.

The locus of perceived equidistance in the eye-level plane was determined at distances of 1.2, 2.2, 3.2, and 4.2 m. from the observer. The stimuli were small, point-like light sources viewed in complete darkness. The observer s head was held fixed; his eyes were allowed to move freely. There were five lights, one in the median plane which remained fixed on every trial, and two variable lights on each side of this at angles of 12° and 24° with respect to the median plane. The locus of perceived equidistance was found to be concave toward the observer at all distances, usually slightly asymmetric with respect to the median plane, and with a variable curvature generally intermediate between that of the physically equidistant circle and that of the corresponding Vieth–Müller circle. The results are inconsistent with an assumption made by Luneberg (1947) in his theory of space perception. The pattern of disparities provided by the locus of perceived equidistance was found to vary with viewing distance. This indicates that the perception does not depend on the spatial distribution of retinal stimulation alone and poses a problem as to the nature of the cues that determine perceived equidistance in this situation.

A66-81882
VITAL CAPACITY: THEORY AND DETERMINATIONS.
Bernard S. Silverman (Westbury Hosp. Lab., Houston, Tex.)
Journal of American Medical Technologists, vol. 28, May–Jun. 1966, p. 241–247.

Basic definitions of lung volumes and capacities are given and discussed in relation to pulmonary function tests. A method is described for the determination of vital capacity by means of a small compact spirometer. The method is stated to be one of the fastest, simplest, and most reliable of procedures now in use. If properly done, this method will aid the physician in diagnosis and treatment of pulmonary anomalies.

A66-81883
EFFECT OF ADRENERGIC BETA-BLOCKADE ON HEAT PRODUCTION UPON ACUTE EXPOSURE TO COLD [DER EINFLUSS ADRENERGER BETA-BLOCKADE AUF DIE WARMEBILDUNG BEI AKUTER KALTEEXPOSITION].
C.-J. Estler, H. P. T. Ammon (U. Erlangen-Nürnberg, Pharmakol. Inst., West. Germany), and O. Strubelt (Med. Akad. Lübeck, Pharmakol. Inst., West Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 4, 1966, p. 227–236. 56 refs. In German.

For the investigation of the influence of the β-sympathicolytic agent propranolol on thermoregulation in white mice, body temperature; oxygen consumption, glycogen, glucose, pyruvate and lactate in liver and skeletal muscle; and glucose, pyruvate, lactate and unesterified fatty acids in the blood were determined. Control animals exposed to an environmental temperature of 0°C. showed a fall of the body temperature by only 3.6°, a rise of the oxygen consumption by 76%, a decrease of the glycogen content of liver and muscle, and an increase of the unesterified fatty acids in the serum. After pretreatment with propranolol oxygen consumption was not increased and the body temperature fell by 17.1°. The glycogen content of liver and muscle was not significantly diminished and the level of unesterified fatty acids in the serum was not raised. These results lead to the suggestion that β-sympathicolysis prevents the mobilization of carbohydrates and fat from the stores, which is necessary for the enhancement of metabolism and heat production.

A66-81884
EFFECTS OF ACUTE SYSTEMIC ANOXIA ON THE CORONARY SINUS PRESSURE AND FLOW IN THE DOG.
J. Litwin, N. Tiedt, and K. Skolasińska (School of Med., Dept. of Human Physiol., Warsaw, Poland).
Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 4, 1966, p. 237–245. 10 refs.

The effects of acute systemic anoxia on blood pressure and flow in the coronary sinus were investigated in 23 anesthetized open-chest dogs. Severe anoxia, produced by inhalation of 100% nitrogen over a period of 1.5 to 2 min. elicited regularly a progressive rise in amplitude of pressure pulsations within the coronary sinus. It amounted at the height of anoxia to 37.3 mm. Hg. on the average, as compared to 5.3 mm. Hg. under control conditions (+600%). Similarly, the mean coronary sinus pressure rose progressively during anoxia. The rise in coronary sinus pressure paralleled the increase of coronary sinus outflow and ventricular contractile force. It evidently preceded the onset of anoxic bradycardia. Bilateral vagotomy, which caused attenuation or abolition of bradycardia, reduced only moderately anoxic rise in coronary sinus pressure. It is concluded that the rise in the amplitude of pressure pulsations in the coronary sinus, encountered in acute systemic anoxia, is due to the increase of ventricular contractile force, and, particularly, to the improved filling of the coronary veins, correlated with the augmentation of coronary blood flow. Anoxic bradycardia is an additional factor contributing to the increased venous filling by prolonging the duration of the filling period.

A66-81885
ALVEOLAR-ARTERIAL OXYGEN DIFFERENCE ($AaDO_2$) AND ALVEOLAR VENTILATION IN THE LAERT DOG IN RELATION TO ENVIRONMENTAL TEMPERATURE [DIE ALVEOLAR-ARTERIELLE SAUERSTOFFDIFFERENZ ($AaDO_2$) UND DIE ALVEOLARE VENTILATION BEIM WACHEN HUND IN ABHANGIGKEIT VON DER UMGEBUNGSTEMPERATUR].
Gerhard Siemon, Klaus Pleschka, and Claus Albers (Max-Planck-Gesellschaft, W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 4, 1966, p. 255–268. 33 refs. In German.

Alveolar ventilation, oxygen consumption and arterial blood O_2 and CO_2 tensions were measured repeatedly in two unanesthetized well-trained dogs at different ambient temperatures without disturbing the natural breathing pattern. At neutral ambient temperature (25°C.) oxygen consumption was five–six ml./(kg.-min.), alveolar ventilation was 20 ml./ml. oxygen consumption, arterial CO_2 tension was 38 Torr, arterial pH was 7.36, and alveolar-arterial oxygen tension difference ($AaDO_2$) was 14 Torr. At lower ambient temperature (20 and 10°C.) oxygen consumption and alveolar ventilation increased

in parallel thus leaving alveolar O_2 and CO_2 tension unchanged. The arterial O_2 tension decreased slightly with the $AaDO_2$ rising well above 20 Torr. At elevated ambient temperatures (up to 38°C.) oxygen consumption and alveolar ventilation increased almost in parallel until the respiratory rate reached peak values of 250–300/min. under which conditions respiratory alcalosis (arterial CO_2 tension of 28 Torr and pH of 7.44) was encountered. The AaDO was again well above the control values. Total ventilation was estimated indirectly to increase by 500–900% of the control value.

A66-81886
VARIABILITY OF ARTERIAL-ALVEOLAR CO_2-TENSION DIFFERENCE [UBER DIE VARIABILITAT DER ARTERIELL-ALVEOLAREN CO_2-SPANNUNGSDIFFERENZEN].

C. Albers, K. Pleschka, and W. Usinger (Max-Planck-Gesellschaft, W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 4, 1966, p. 269–274. 9 refs. In German.

The arterial-alveolar CO_2 tension difference ($aAD\text{-}CO_2$) was determined in 21 anesthetized dogs breathing spontaneously under a variety of experimental conditions. The average $aAD\text{-}CO_2$ was 4.5 Torr. Vagotomy, positive pressure breathing (around +10 cm. H_2O) or negative pressure breathing (around −10 cm. H_2O) did not affect the $aAD\text{-}CO_2$. On the other hand, increasing the fraction of CO_2 in the inspired gas caused a highly significant decrease in the $aAD\text{-}CO_2$ (in the average the $aAD\text{-}CO_2$ was 6 Torr without and 2.5 Torr with additional CO_2 in the inspired gas). This effect may have some importance in the interpretation of CO_2 response curves based on endexpiratory CO_2 tensions rather than arterial CO_2 tensions.

A66-81887
OCCURRENCE AND PREVENTION OF POSTASPHYXIAL INTRAVENTRICULAR PRESSURE GRADIENTS.

J. M. Dieudonné (Montreal U., Dept. of Physiol., Canada).
Canadian Journal of Physiology and Pharmacology, vol. 44, Mar. 1966, p. 209–215. 15 refs.
Grant MRC, Canada MA-1651 and Quebec Heart Found. supported research.

Following the earlier demonstration of a systolic pressure gradient across the ventricular outflow tract after exogenous cardiac stimulation, a severe stressor, asphyxia, was produced in rats to determine whether inotropic stimulation of endogenous origin would induce comparable intraventricular systolic pressure gradients. Only during the oxygen rebound phase was a transient ventriculo-aortic pressure gradient demonstrable; it did not appear after treatment with dichloroisoproterenol and was inhibited by bilateral adrenalectomy. It is concluded that the pressure gradient coincided with a marked inotropic stimulation resulting from the release of catecholamines with adrenomedullary participation under adequate oxygenation.

A66-81888
BIOCHEMISTRY OF BROWN FAT AND LIVER OF HIBERNATING GOLDEN-MANTLED GROUND SQUIRRELS (CITELLUS LATERALIS).

R. R. J. Chaffee, E. T. Pengelley, J. R. Allen, and R. E. Smith (Calif. U., Dept. of Life Sci., Riverside and Center for Health Sci., Dept. of Physiol., Los Angeles).
Canadian Journal of Physiology and Pharmacology, vol. 44, Mar. 1966, p. 217–223. 18 refs.
NASA Grant NsG 721, Contract DA-49-193-MD-2558, Grants NSF G19295, GB 2155 and Kaiser Found. 50.

Studies were made on the effects of cold acclimation culminating in hibernation on the weight and mitochondrial nitrogen content and enzymatic activity of brown fat and liver of ground squirrels (*Citellus lateralis*). The hibernating animals were living at a room temperature of 2 ±1°C, the controls at 24 ±2°C. The body and liver weights of the hibernating animals were both 20% lower than those of the controls, but the brown fat of the hibernators was 40% greater in absolute weight and its ratio to body weight was double that of the controls. Respiration rates of liver and interscapular brown fat mitochondria from both control and hibernating squirrels were determined with various substrates. Oxidation of α-glycerophosphate and glutamate by brown fat mitochondria from hibernating animals was 47% and 37% higher, respectively, than control values. Liver mitochondria from hibernating animals were 50% higher in oxidation of succinate than were control mitochondria, but 34% lower in oxidation of α-glycerophosphate. The increased oxidative activity of brown fat, together with the increased ratio of brown fat weight to body weight, indicates that the thermogenic capability of brown fat is enhanced in the process of preparation for hibernation.

A66-81889
DEVELOPMENT OF A STRAIN OF RATS WITH GREATER THAN NORMAL SUSCEPTIBILITY TO OXYGEN POISONING.

J. D. Wood (Defence Res. Med. Labs., Toronto, Canada).
Canadian Journal of Physiology and Pharmacology, vol. 44, Mar. 1966, p. 259–265. 7 refs.

Male and female rats of the Wistar strain were exposed to oxygen at high pressure (OHP) once per week for three weeks. Based on the incidence and severity of the convulsions observed, animals were selected which were considered the most susceptible and the most resistant to oxygen poisoning. The animals were mated and the offspring exposed to OHP. The rats from susceptible parents were more than normally susceptible to oxygen poisoning as gauged by time until onset of convulsions, incidence and severity of convulsions, and mortality. The animals from resistant parents were no more tolerant of OHP than were the randomly selected rats of the parent generation. Similar results were observed with a third generation of rats obtained by mating second generation susceptible and resistant animals respectively.

A66-81890
STUDIES ON HABITUATION TO COLD PAIN.

Jacques LeBlanc and Pierre Potvin (Laval U., School of Med., Dept. of Physiol., Quebec, Canada).
Canadian Journal of Physiology and Pharmacology, vol. 44, Mar. 1966, p. 287–293. 6 refs.
Grant DRB, Canada 9310-79.

Habituation to cold was produced in human subjects by immersing the left hand in cold water for 2-1/2 minutes twice a day for 19 days. The right hand did not adapt. Another group of subjects was exposed similarly with the difference that an anxiety test (mental arithmetic test) was always given simultaneously with the cold-water test. In this second group the original blood pressure response, i.e. for the first day, was greater than in the first group because of the cumulative effects of the two tests. After 19 days definite evidence was obtained for adaptation to these two tests administered together. However, when these tests were given separately to the second group, no adaptation was evident; adaptation occurred only to both tests given simultaneously. These results indicate that no adaptation develops to cold per se if the subjects are distracted from cold discomfort. It was also found that adaptation

of one hand to cold water not only failed to induce adaptation in the opposite hand but even enforced responses of the unadapted hand. These findings suggest a participation of the central nervous system in adaptation to cold pain, and tend to minimize the importance of local peripheral changes.

A66-81891
URINARY EXCRETION OF GLUCURONIDES BY COLD-ACCLIMATED RATS.
W. H. Cottle and A. T. Veress (Alberta U., Dept. of Physiol., Edmonton, Canada).
Canadian Journal of Physiology and Pharmacology, vol. 44, Mar. 1966, p. 325–326.
Grant MRC, Canada MA-1308.

Urinary excretion of glucuronic acid derivatives after administration of sodium benzoate was measured in cold-acclimatized rats (5 ±1°C. for one month). Cold-acclimatized rats excreted more glucuronide derivatives than did control animals (25 ±0.5°C. for one month), and the excretion was greater after sodium benzoate administration. This suggests that the conjugation mechanism for glucuronic acid and thyroxine is increased by cold-acclimatization.

A66-81892
RESPONSES OF SOME ENDOCRINE ORGANS OF FEMALE HAMSTERS TO PINEALECTOMY AND LIGHT.
Roger A. Hoffman and Russel J. Reiter (Med. Res. Lab., Res. Labs., Physiol. Dept., U.S. Army Edgewood Arsenal, Md.)
Life Sciences, vol. 5, Jun. 1966, p. 1147–1151. 20 refs.
U.S. Army Edgewood Arsenal Res. Labs. supported research.

The responses of female hamsters to two daily light cycles were measured, and the influence of the pineal gland on the gonads was studied. In light–dark (LD) cycles of 1:23, the adrenal glands of the pinealectomized animals were significantly heavier than those of the pinealectomized animals in LD cycles of 16:8. Neither pineal ablation nor exposure to short daily periods of light induced any change in ovarian weight. Pinealectomy induced a non-significant decrease in uterine weights of animals exposed to LD 16:8 when compared to sham-operated controls. Uteri of pinealectomized animals in LD 1:23 were significantly larger than those of their sham-operated controls and also significantly larger than those of pinealectomized animsls in LD cycles of 16:8.

A66-81893
A FINITE STATE APPROACH TO THE SYNTHESIS OF BIOENGINEERING CONTROL SYSTEMS.
R. Tomović and R. B. McGhee (Southern Calif. U., Los Angeles).
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, Jun. 1966, p. 65–69. 9 refs.
Grant AF-AFOSR-496-65.

The design of devices capable of duplicating the function of human extremities has become increasingly important in science, industry, and medicine. This paper presents an approach to the synthesis of control systems for such machines which results in extremely simple finite state controllers. The technique proposed rests on the definition of a new type of actuator, called a cybernetic actuator, which possesses the property of producing continuous controlled motion from an input which may assume only four distinct states. The application of such actuators to bioengineering systems is illustrated by the design of a control system for an artificial leg.

A66-81894
A RE-ANALYSIS OF THE PILOT EYE-MOVEMENT DATA.
J. W. Senders (Bolt, Beranek and Newman, Inc., Cambridge, Mass.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, Jun. 1966, p. 103–106. 10 refs.
NASA Contract NAS1-3860.

Since records of the instrument reading during flights were not taken, there has been no opportunity afforded by flight data to test the predictions of theory as to frequency of sampling of the various instruments and total time spent on each instrument. Given the measured time spent on each instrument, it has been possible to test the transition model. The results of this test show that the transition model does not predict within reasonable error (from the theoretical point of view) the "link values" observed in flight. However, the constraints on transitions imposed by frequency of sampling enforce a general adherence to the model. As a result, although it is almost surely the case that scanning patterns exist, they must co-exist with the demands of arithmetic. For design purposes, the predictions of the model appear good enough. Where there exist three or more instruments with very similar probabilities of sampling, there is a greater freedom for the observer to use scanning patterns. Therefore, when three or more such instruments exist in a system, more caution must be used in applying the model. Where only one or two instruments dominate the array, far less freedom can exist. In future flight tests or simulator studies of eye movements and sampling, complete records should be taken of all the signals entering and leaving the cockpit if a complete understanding is desired of the work that the pilot is doing.

A66-81895
COAGULATION OF NERVE CENTERS BY LASER BEAM [COAGULATION DES CENTRES NERVEUX A L'AIDE D'UN RAYONNEMENT LASER].
William Pellet, Gérard Hauchecorne, Monique Denavit, and Robert Naquet (C.N.R.S., Inst. de Neurophysiol. et Psychophysiol., Lab. de Neurophysiol. Appl., Marseille and Inst. Marey, Lab. de Physiol. des Centres nerveux, Paris, France).
Comptes Rendus des séances de l'Académie des Sciences, vol. 262, Jun. 20, 1966, p. 2634–2636. In French.

Eighty well localized coagulations of deep brain tissue were effected in 19 cats by laser beam (4 J per 200 microseconds). Laser energy may someday be used in preference to other methods for the production of localized brain lesions.

A66-81896
CASE OF CHRONIC BENZENE POISONING WITH LEUKOCYTE ANOMALY, PELGER-HUET TYPE [UN CASO DI BENZOLISMO CRONICO CON ANOMALIA LEUCOCITARIA TIPO PELGER-HUET].
G. Saita and L. Moreo (Milan U., Clin. del Lavoro "L. Devoto" and Centro Studi e Ric. sulle mal. profess. sotto patronato dell'INAIL, Italy).
Medicina del Lavoro, vol. 57, May 1966, p. 331–335. 33 refs. In Italian.

A fatal case of bone marrow aplasia due to benzene poisoning is described. A few months before death atypical nuclei of granulocytes appeared, characteristic of the Pelger–Huet anomaly (a familiar abnormality, transmitted as a dominant character). The occurrence of the anomaly suggests an acquired anomaly (pseudo-Pelger), which could be attributed to the action of benzene. A less convincing hypothesis is that benzene would not be the direct determining cause, but only the revealer of a congenital abnormality, morphologically not expressed due to low penetrance of the Pelger gene.

A66-81897
HYGIENIC-SANITARY PREVENTION IN THE PREPARATION OF AN ANTI-DETONATING MIXTURE CONTAINING TETRAETHYL LEAD [LA PREVENZIONE IGIENICO-SANITARIA NELLA PREPARAZIONE DELLA MISCELA ANTIDETONANTE A BASE DI PIOMBO TETRAETILE].
G. Armeli (Soc. Montecatini, Serv. Sanit. e di Igiene Ind., Milan, Italy).
Medicina del Lavoro, vol. 57, May 1966, p. 336–342. 14 refs. In Italian.

The physico-chemical characteristics which make tetraethyl lead one of the most important industrial poisons and the techniques for the preparation of an anti-detonating mixture containing tetraethyl lead are summarized. The hygienic–sanitary measures taken in an Italian factory to prevent lead poisoning are described. Due to these hygienic measures no cases of poisoning occurred, and the mean lead values in urine remained within limits of complete security during a period of about one year.

A66-81898
SEX DIFFERENCES IN AUTONOMIC RESPONSES DURING INSTRUMENTAL CONDITIONING.
Lindsay A. Graham, Sanford I. Cohen, and B. M. Shmavonian (Duke U., Med. Center, Div. of Psychophysiol. Res., Durham, N. C.)
Psychosomatic Medicine, vol. 28, May–Jun. 1966, p. 264–271. 6 refs.
Grants AF-AFOSR 67-53, PHS GM 05-385, M-6022; Geigy Pharm. Co. and NSF supported research.

The behavior of 21 women in an instrumental conditioning experiment using a punch-avoidance response was quite similar to that of a previously studied group of men. However, the women had lower levels of galvanic skin response (GSR) activity and higher heart rates. GSR discrimination during avoidance learning was less pronounced for women than for men. Both groups had a tendency for heart rate to slow when behavior was inhibited by instruction.

A66-81899
GENERALIZATION BETWEEN PHOTIC AND ELECTRICAL STIMULATION TO THE VISUAL SYSTEM.
Stephen T. Kitai (Wayne State U., Detroit, Mich.)
Journal of Comparative and Physiological Psychology, vol. 61, Jun. 1966, p. 319–324. 6 refs.

This study investigated the degree to which intracranial electrical stimulation (test stimulus) would evoke a conditioned response (CR) that had been originally trained to a photic stimulus. Rats with chronically implanted electrodes were initially trained to press a lever for food with light as conditioned stimulus (CS), CRs to the test stimulus were extinguished, and generalization of extinction to the original CS (light) was tested. Responding to the test stimulus was highest for the optic chiasma, followed by occipital cortex, superior colliculus, and the frontal cortex in decreasing order. There was no difference between groups in the extinction rate to the original CS.

A66-81900
ACQUISITION, RETENTION, AND EXTINCTION UNDER CONDITIONS OF WATER DEPRIVATION AND OF CENTRAL CHOLINERGIC STIMULATION.
Khalil A. Khavari and Roger W. Russell (Ind. U., Bloomington).
Journal of Comparative and Physiological Psychology, vol. 61, Jun. 1966, p. 339–345. 14 refs.
Grant NIMH MH 06997.

The present experiments show that the effects of direct cholinergic stimulation in the lateral hypothalamus go beyond the mere initiation of drinking behavior. Central stimulation and water deprivation were analogous in eliciting consummatory behavior, in acquisition of straightaway approach and T-maze responses, in relearning of the T maze following a period of no practice, and in maintenance of these learned responses. Behavior acquired when the motivating conditions were present disappeared when they were removed; during their presence the behavior was rapidly extinguished when water reinforcement was not available.

A66-81901
SELF-STIMULATION OF HIPPOCAMPUS IN RATS.
Reidun Ursin, Holger Ursin (Oslo U., Norway) and James Olds (Mich. U., Ann Arbor).
Journal of Comparative and Physiological Psychology, vol. 61, Jun. 1966, p. 353–359. 19 refs.
NASA Grant NsG-626, Grants PHS MH-02839, M-06195, FF-272, and NSF G-13144.

Rats with probes chronically implanted in the hippocampal gyrus and the dentate gyrus were subjected to self-stimulation tests. Electric stimulation in hippocampal gyrus produced bar-pressing rates significantly above operant levels. Electric stimulation in dentate gyrus produced rates significantly below operant levels. Self-stimulation rates via hippocampal probes were far lower than those observed in other related studies utilizing probes in hypothalamus.

A66-81902
HABITUATION OF GSR AS A FUNCTION OF STIMULUS DURATION AND SPONTANEOUS ACTIVITY.
Jean E. Koepke and Karl H. Pribram (Stanford U., Palo Alto, Calif.)
Journal of Comparative and Physiological Psychology, vol. 61, Jun. 1966, p. 442–448. 18 refs.
Grants PHS MH-8304 and MH-03732.

Habituation of galvanic skin response (GSR) to repeated stimulation with tones of either 2- or 20-sec. duration was investigated with college students. Subsequent to habituation, stimulus durations were reversed immediately for half the subjects and after a number of additional trials for the remaining subjects. Speed of habituation did not vary with stimulus duration but was significantly related to "spontaneous activity" as defined by spontaneous fluctuation scores. Orienting to the reversal in stimulus duration was indicated by an overall increase in latency and an increase in response duration for subjects changed from a 2- to a 20-sec. stimulus.

A66-81903
TOXICITY AND METABOLISM OF INDUSTRIAL SOLVENTS.
Ethel Browning (Min. of Labour and Natl. Serv., London, Great Britain).
Amsterdam, The Netherlands, Elsevier Publ. Co., 1965, xi+739 p. Many refs. $32.50.

The toxicity of a variety of industrial solvents and the effects on human metabolism are presented. The industrial solvents considered are benzene and other aromatic hydrocarbons; cyclic, technical, and halogenated hydrocarbons; nitrogen compounds; alcohols; ketones; aldehydes and acetals; ethers, esters, glycols and derivatives; silicone compounds; furan and tetrahydrofuran; carbon disulfide; dimethyl sulfate; and dioxan.

A66-81904
THE HUMAN BODY IN EQUIPMENT DESIGN.
Albert Damon (Harvard U., Cambridge, Mass.), Howard W. Stoudt, and Ross A. McFarland (Harvard School of Public Health, Boston, Mass.)
Cambridge, Mass., Harvard U. Press, 1966. viii+360 p. Many refs.

Anthropometric data are presented to serve as a guide for the designer of equipment involving human body size and mechanical capabilities. The goals of the design engineer in accommodating human dimensions should include operability of all machines by all men. Effects of clothing and personal equipment; factors influencing human body size; sources of anthropometric data; static and dynamic human body dimensions; center of gravity and moment of inertia; range of motion at the joints of the body; muscle strength; speed of body motion; human body composition; tolerance to physical and mechanical force; and design recommendations for hand and foot controls, seats, doors and escape hatches, and lifting and carrying objects are discussed with extensive diagrams and charts.

A66-81905
THE HIBERNATION CYCLE AND RELATED CHANGES IN THE BROWN FAT TISSUE OF CITELLUS LATERALIS.
E. I. Grodums, W. A. Spencer, and G. Dempster (Saskatchewan U., Dept. of Bacteriol., Saskatoon, Canada).
Journal of Cellular Physiology, vol. 67, Jun. 1966, p. 421–425. 15 refs.
MRC, Canada supported research.

The hibernating habits of *Citellus lateralis* under standard laboratory conditions are described. It is possible to use a biopsy technique to investigate the brown fat tissues without serious disturbance to the hibernation pattern. This technique was used to sample brown and white fat tissues in the same animal at various seasons of the year. Histological studies did not reveal any changes in morphology of lipid composition which could be related purely to the hibernating season; however, during the short periods of arousal a large proportion of the brown fat cells appeared to be partially depleted of neutral fat. At this time a large increase in Luxol-fast-blue staining was always observed, which may be due to unmasking of tissue phosphatides.

A66-81906
THE GLYCERIDE FATTY ACID COMPOSITION AND LIPID CONTENT OF BROWN AND WHITE ADIPOSE TISSUE OF THE HIBERNATOR CITELLUS LATERALIS.
W. A. Spencer, E. I. Grodums, and G. Dempster (Saskatchewan U., Dept. of Bacteriol., Saskatoon, Canada).
Journal of Cellular Physiology, vol. 67, Jun. 1966, p. 431–441. 23 refs.
MRC, Canada supported research.

Glyceride and total phosphatide levels of brown and white fat of *Citellus lateralis* were followed throughout the year in biopsy samples. Extraction of the glycerides for fatty acid analysis is described. As much as 20% of the phosphatide of brown fat was found in the upper fat layer of a centrifuged tissue homogenate. This phosphatide appeared to be present as a low-density lipoprotein, and may be associated with the lipid globules of the intact cell. Glyceride and phosphatide levels varied considerably in brown fat, and no particular level was consistently observed to be associated with any part of the hibernation cycle. Fatty acid composition of the glycerides also varied widely. The degree of unsaturation was not related to the hibernation cycle, although there appeared to be a differential utilization of fatty acids during a few weeks prior to spring arousal. A decrease in tissue glyceride levels was observed in both brown and white fat during arousal from hibernation at 2°C, the loss from brown fat being double the loss from white fat.

A66-81907
EFFECT OF TACHYCARDIA ON CARDIAC OUTPUT DURING NORMAL AND INCREASED VENOUS RETURN.
Tsuneaki Sugimoto, Kiichi Sagawa, and Arthur C. Guyton (Miss. U., Med. Center, Dept. of Physiol. and Biophys., Jackson).
American Journal of Physiology, vol. 211, Aug. 1966, p. 288–292. 11 refs.
NIH and AHA supported research.

The effect of heart rate change on cardiac output was studied at various levels of right and left atrial pressure. At each atrial pressure, there was a different range of heart rate at which the cardiac output was maximal. As the atrial pressure increased, the heart rate range for maximal cardiac output shifted to a higher level. This tendency was enhanced during norepinephrine infusion.

A66-81908
MYOCARDIAL LACTATE OXIDATION IN SITU AND THE EFFECT THEREON OF REDUCED CORONARY FLOW.
Douglas M. Griggs, Jr., Shiro Nagano, Jose G. Lipana, and Paul Novack (Hahnemann Med. Coll. and Hosp., Dept. of Med., Philadelphia, Pa.)
American Journal of Physiology, vol. 211, Aug. 1966, p. 335–340. 21 refs.
Grants NIH HE 07469 and K3-HE-12,428.

A tracer method based on the production of $C^{14}O_2$ from lactate-1-C^{14} was devised for estimating the rate at which blood lactate undergoes oxidative decarboxylation in the myocardium of the open-chest dog when blood flow to the cannulated main left coronary artery is at control or reduced rates. Under control conditions, an average value of 31.4 ±10.9 μM/100 g. per min. was obtained, which closely approximated that of net myocardial lactate uptake. Complete oxidation of this amount of lactate accounted for 24.7% of the oxygen consumed by the myocardium. When coronary flow was mechanically reduced to insufficiency levels, oxidative decarboxylation of lactate persisted at 14.9 ±5.9 μM/100 g. per min. at a time when the arterio-coronary sinus lactate difference revealed net myocardial lactate production. Pyruvate uptake and coronary sinus pH were reduced. These findings suggest that the primary metabolic fate of lactate entering the myocardium is oxidation, and that when left coronary flow is sufficiently reduced, aerobic and anaerobic metabolism occur simultaneously in different regions of the contracting myocardium.

A66-81909
EXERCISE PERFORMANCE OF UPPER-BODY X-IRRADIATED DOGS.
Barbara A. Martin and Sol M. Michaelson (Rochester U., School of Med. and Dentistry, Dept. of Radiation Biol. and Biophys., N. Y.)
American Journal of Physiology, vol. 211, Aug. 1966, p 457–461. 14 refs.
Contract AEC W-7401-Eng-49 and Defense Atomic Support Agency supported research.

Exercise performance of upper-body X-irradiated dogs during the acute and early chronic phases of radiation injury was investigated. Seven mongrel dogs of both sexes were exercised on a motor-driven treadmill at 2.2 m.p.h. on a 0% grade. Five dogs were bilaterally exposed to 1,800 r midline

air dose (MAD) of 1,000 kvp X-rays, at a dose rate of 58 r/min. Two dogs were sham irradiated. Comparisons were made of performances in pre- and postexposure exercise trials. Data were collected on body weight, arterial oxygen saturation, heart rate, rectal temperature, and hematology. With exercise of the intensity and duration used in the present study, upper-body X-irradiated dogs appeared able to maintain a level of physical performance comparable to their pre-exposure capabilities until about two months after radiation. At this point, a diminution in performance capacity appeared, as indicated by the increase in resting heart rate, the inability of the heart rate to properly adjust to the demands of exercise, and one instance of collapse. It was concluded that this exercise had become stressful after radiation.

A66-81910
EFFECT OF TETRAETHYLLEAD ON LEARNING AND MEMORY IN THE RAT.
John D. Bullock, Robert J. Wey, John A. Zaia, Irwin Zarembok, and Henry A. Schroeder (Dartmouth Med. School, Dept. of Physiol., Hanover, N.H.)
Archives of Environmental Health, vol. 13, Jul. 1966, p. 21–22.

Tetraethyl lead injected into rats in doses sufficient to cause overt neurotoxicity (15 ml./kg. body weight) did not significantly depress ability to learn a simple task, escape from a water T-maze, nor to remember the task.

A66-81911
THERMAL RESPONSES OF MAN DURING REST AND EXERCISE IN A HELIUM OXYGEN ENVIRONMENT.
Edward L. Fox, Harold S. Weiss, Robert L. Bartels, and Edwin P. Hiatt (Ohio State U., Columbus).
Archives of Environmental Health, vol. 13, Jul. 1966, p. 23–28. 26 refs.
NASA Grant NsG-295-62.

Mean skin temperature (MST), rectal temperature, mean body temperature, sweat loss, and heart rate were measured in man during rest (15 minutes), moderate exercise (15 minutes), and recovery (45 minutes) while exposed either to 79% He–21% O_2 or to air. Test conditions were ground level pressure and either (1) 95°F. and 90% relative humidity (RH), (2) 95°F. and 40%–6% RH, or (3) 71°F. and 45%–50% RH. At high temperature irrespective of RH, responses in He–O_2 were similar to those in air. At low temperature MST in He–O_2 was lower by 1.0°F. during rest, by 2.3°F. at end of exercise ($P<0.05$), and by 2.0°F. at end of recovery ($P<0.05$). Rest, exercise, and recovery rectal and mean body temperatures and heart rates were the same in the two media, but sweat loss was 27% less ($P<0.05$) in He–O_2. These differences are explained by the higher thermal conductivity of He relative to N_2 affecting conductive-convective heat loss in proportion to the skin-to-gas thermal gradient. Calculations indicate that for each °F. increase in gradient, MST in He–O_2 will be approximately 0.1°F. lower than in air.

A66-81912
ENVIRONMENTAL CHAMBER FOR THE STUDY OF RESPIRATORY STRESS IN SMALL ANIMALS.
Elinor M. Glauser and Stanley C. Glauser (Temple U., School of Med., Dept. of Pharmacol., Philadelphia, Pa.)
Archives of Environmental Health, vol. 13, Jul. 1966, p. 61–65. 23 refs.
Grants NIH HE-8752 and AM-10072.

Two environmental chambers were designed in order to study the effects of respiratory stress in animals of different sizes and social habits. The first chamber, which contained a single metabolism cage, was designed for small gregarious animals, such as rats. The second chamber, which contained six metabolism cages, was designed for larger animals, such as piglets, kittens, and puppies. The design of both types was basically similar. The metabolism cages sat on a platform. Covering the cages and sealed to the platform was an aluminum frame covered with polyvinyl plastic. External to the environmental chamber there was apparatus for gas mixing and for monitoring the affluent and effluent gas from the chamber. Within the chamber there was a centrally located circulating pump to ensure uniform gas mixing. This environmental chamber is inexpensive and readily constructed and suitable for both chronic and acute exposure studies.

A66-81913
REACTION TIMES TO NEW VERSUS REPEATED SIGNALS IN A SERIAL TASK AS A FUNCTION OF RESPONSE-SIGNAL TIME INTERVAL.
Paul Bertelson and Andre' Renkin (U. libre de Bruxelles, Belgium).
Acta Psychologica, vol. 25, Mar. 1966, p. 132–136. 8 refs.
Fonds natl. de la Rech. sci. supported research.

Previous experiments showed that serial choice reaction time is longer on the trials where the stimulus is different from the preceding one. The influence on this phenomenon of the duration of the time-lag between the end of the response and the arrival of the next signal was examined. Sixteen subjects gave 600 responses on each of four sessions on a self-paced two-choice task, where they responded with one of two keys to the presentation of one of two shapes. Response-signal intervals of 50, 200, 500 and 1,000 msec. were presented, following both a regular and an irregular procedure. Under both procedures, the difference between reaction times to new and two repeated stimuli was shown to decrease with the passage of time.

A66-81914
ASPECTS OF THE CRITERION PROBLEM IN SMALL GROUP RESEARCH. I. BEHAVIORAL DOMAINS TO BE STUDIED.
Irwin Altman (Natl. Naval Med. Center, Naval Med. Res. Inst., Bethesda, Md.)
Acta Psychologica, vol. 25, Mar. 1966, p. 101–131. 57 refs.

In this paper the general criterion question regarding small group behavior, namely, "How is the group doing?" was expanded to include questions concerning the total behavior of group members as they worked on a task, i.e., their interpersonal behavior, their goal-contributory behavior, as well as those behaviors directly related to task performance. Thus, the criterion question was defined to include a very broad range of behaviors which conceptually and sequentially link to each other and which eventually interact and combine to affect final group output. From such a starting point an attempt was made to develop a general "language" of behavior which would include under its umbrella the vast numbers of types of behaviors possible, would link them to one another and which could be applied over a variety of situations. The advantages and limitations of such a general behavior classification system were discussed, specifically with respect to the description of ongoing social interaction in small group situations.

A66-81915
A SYSTEMS ANALYSIS OF THE DECISION-MAKING PROCESS: PSYCHIATRY'S "BASIC SCIENCE".
Charles E. Goshen (W. Va. U., School of Med., Morgantown).
American Journal of Psychotherapy, vol. 20, Apr. 1966, p. 235–251.

The human decision-making process is portrayed in this report as the fundamental "basic science" of psychiatry, and it has been subjected to a systems analysis. Variations of the ordinary, rational thinking processes are further analyzed as examples of complex systems, and variants of the rational process. The results of this study are graphically portrayed as flow diagrams. It is proposed that the systems analysis presented lends itself to an orderly and remarkably simple way of understanding, teaching, and communicating ideas about human behavior in general and psychiatric problems in particular. Although it was not the intention of the study, the process of ordering the knowledge of human thinking in this way has the effect of contradicting many of the concepts ordinarily taught in psychiatry and psychology. There is no necessity, for instance to postulate an "unconscious" as is necessary in certain theories of human behavior, except that unconsciousness concerning certain ideation in a patient might well be a property of the observer concerning the patient. Another common concept in conflict with the material presented sees uncomfortable emotional states solely as the motive for thought or action and not as the result of thought. The understanding of phobias is a rather simple process as presented in this report, far different from the complicated theories often used to explain them.

A66-81916
INFORMATION THEORY AND FIGURE PERCEPTION: THE METAPHOR THAT FAILED.

R. T. Green and M. C. Courtis (U. Coll., London, Great Britain). *Acta Psychologica*, vol. 25, Jan. 1966, p. 12–36. 34 refs.

Attempts to bring figure perception within the ambit of information theory, although superficially attractive, turn out on closer inspection to be misdirected. Not only are some fundamental principles of the theory flagrantly violated, the data themselves simply do not justify the desecration of information theory on pragmatic grounds. It is further argued that it is meaningless to talk of the location of information within a figure as if it were something independent of the percipient or the task imposed. This error stems directly from failing to recognize that borrowing the language of information theory to discuss the problems of figure perception is to employ a metaphor of limited scope. In order to apply information theory legitimately to figure perception at least four principles must be observed: the scanning sequence, the alphabet of signs, and the grain or mosaic of the display must all three be defined, and the transition probabilities between the elements must be objective. Not one of these conditions can be met in genuine figure perception. Figure perception, as it occurs naturally, does not involve the scanning of a mosaic of elements in a manner analogous to a television camera dealing with a grained photographic print. A study of the practice of professional cartoonists indicates that the percipient is called upon to respond to partial cues, drawing on his past experience to fit the whole into a schema that 'makes sense' of the display. The sorts of hypotheses the percipient entertains, and where he looks within the display for relevant cues, must depend on the task as presented to and conceived by the percipient, and on the percipient's past experience. It is suggested that there are two distinct stages in this perceptual discrimination process: to identify the figure as belonging to a particular class, and to establish its unique identity as a member of that class. These stages are therefore characterized by a search for those cues that are: (a) most typical of that class, and (b) most unique to the particular member of that class. The location and the amount of information thus depend, among other things, on what the percipient thinks he is looking for, and are bound to change during the actual process of perceiving.

A66-81917
ON SOME ASPECTS CONCERNING THE ACTION OF TRITON IN THE RAT POISONED WITH CARBON TETRACHLORIDE [SU ALCUNI ASPETTI DELL'AZIONE DEL TRITON NEL RATTO INTOSSICATO CON TETRACLORURO DI CARBONIO].

M. T. Ajello, R. Angelico, G. Cavina, M. Manganaro, and L. Moretta (Ist. Superiore di Sanità, Lab. di Biol., Rome, Italy). *Bollettino della Società Italiana di Biologia Sperimentale*, vol. 42, Feb. 15, 1966, p. 104–106. 12 refs. In Italian.

One group of rats received only mineral oil and another group mineral oil containing 0.25, 0.10, or 0.05 ml/100 g, body weight of carbon tetrachloride (CCl_4). After two hours, rats from each group were injected in the caudal vein with a sodium chloride solution or 0.25 ml. of 20% Triton solution; 90 minutes later all animals were sacrificed by decapitation and studies of the liver were made. Triglyceride accumulation was found in the liver with a decrease in the blood with CCl_4 doses of 0.05 and 0.10 ml./100 g. body weight. Triton induced, in normal animals, a notable increase in blood triglycerides (6–7 times normal values) and in CCl_4 poisoned animals (2–3 times base values). Carbon tetrachloride treatment produced significant decreases in blood triglycerides, phospholipids, diglycerides, and cholesterol esters, with no change in free cholesterol or free fatty acids. Triton increased triglyceride content up to 9 times, and produced increases in phospholipids and diglycerides, with total cholesterol remaining unchanged. In CCl_4 poisoned animals the increase in triglycerides and phospholipids attributed to Triton was reduced. It is concluded that CCL_4 is capable of rendering less evident the action of Triton even at doses of 0.05 ml./100 g. body weight. The effect of Triton appears to be most prevalent on triglycerides, phospholipids, and diglycerides, confirming the hypothesis that there exists an unspecific formation of irreversible Triton-lipid substrate complexes, unattackable by lipolytic enzymes.

A66-81918
STUDIES OF CARDIOPULMONARY BLOOD VOLUME: MEASUREMENT OF TOTAL CARDIOPULMONARY BLOOD VOLUME IN NORMAL HUMAN SUBJECTS AT REST AND DURING EXERCISE.

Gilbert E. Levinson, Albert D. Pacifico, and Martin J. Frank (N. J. Coll. of Med., Dept. of Med., Div. of Cardiovascular Diseases and B. S. Pollak Hosp. for Chest Diseases, Thomas J. White Cardiopulmonary Inst., Jersey City, N. J.)

Circulation, vol. 33, Mar. 1966, p. 347–356. 60 refs.

Grants PHS HE-08581, HE-06376, and HE-5510; Union County Heart Assn. supported research.

Eighty-one measurements of the total cardiopulmonary blood volume were obtained in 15 normal human subjects. At rest, total cardiopulmonary blood volume ranged from 301 to 546 ml./m.^{2}, with a mean of 422 ml./m.^{2}, and it represented 15% of estimated total blood volume. Cardiopulmonary blood was significantly larger in the male subjects than in the female. Reproducibility of measurements was good: the mean discrepancy between successive replications was 25 ml./m.^{2} and the mean coefficient of variation 3.7%. There was no correlation between cardiac output and cardiopulmonary blood volume but a significant correlation ($r=0.79$, $P<0.0001$) was evident between cardiopulmonary blood volume and stroke volume. With elevation of the legs to the pedals of a bicycle ergometer, a small but statistically significant increase occurred in cardiopulmonary blood volume, but no significant changes occurred in cardiac output, heart rate, or stroke volume. With exercise, no further significant change in cardiopulmonary blood volume occurred, despite significant increases in output, rate and

stroke volume. Analysis of cardiac output measurements, both at rest and during exercise, indicates that aortic root sampling is characterized by an appreciably higher reproducibility than that reported for peripheral arterial sampling.

A66-81919
NEW DATA ON THE QUESTION OF LIPOPEROXIDATION IN CARBON TETRACHLORIDE POISONING.
Richard O. Recknagel, and Amiya K. Ghoshal (Western Reserve U., School of Med., Dept. of Physiol., Cleveland, Ohio).
Experimental and Molecular Pathology, vol. 5, Apr. 1966, p. 108–117. 24 refs.
Grants PHS AM-01489 and 5-K3-GM-900-07.

Administration of antioxidants to rats prior to carbon tetrachloride protects against lethality of the hepatotoxin. The protective effect implicates destructive peroxidations as a vector of the toxic action. However, when evidence for increased lipoperoxidation was sought through use of the thiobarbituric acid (TBA) reaction, none could be found throughout the first 25 hours after intragastric carbon tetrachloride administration. However, it was shown that rat liver whole homogenates, prepared in saline-phosphate buffer at pH 7.4 and containing ethylenediamine tetraacetic acid (EDTA), when incubated at 38° could induce disappearance of TBA-positive material generated by a prior incubation. Authentic malonic dialdehyde, added as substrate, was also metabolized. The enzyme system, localized in the mitochondrial fraction, was inactive in the absence of adenosine triphosphate, Mg^{++}, and inorganic phosphate. The significance of the failure to find TBA-positive material in livers of carbon tetrachloride-poisoned rats is thus greatly lessened, since evidently the TBA-positive material can be further metabolized. It was also shown that the system in the whole homogenate, which generates TBA-positive material in mild acid media containing no EDTA, is inhibited by small amounts of carbon tetrachloride added in vitro. However, the loss of this capacity in whole homogenates prepared from livers of carbon tetrachloride-poisoned rats is probably a secondary phenomenon not due to a direct effect of the hepatotoxin.

A66-81920
LIPOPEROXIDATION OF RAT LIVER MICROSOMAL LIPIDS INDUCED BY CARBON TETRACHLORIDE.
Richard O. Recknagel and Amiya K. Ghoshal (Western Reserve U., School of Med., Dept. of Physiol., Cleveland, Ohio).
Nature, vol. 210, Jun. 11, 1966, p. 1162–1163. 8 refs.

Six rats were fasted overnight, following which three were given 250 μl. of carbon tetrachloride (CCl_4) intragastrically, in mineral oil, per 100 g. body weight, and three rats received mineral oil alone. The rats were killed after 90 min. or six hr., and the liver microsomes were recovered. Typical diene conjugation absorption levels were demonstrated which indicated an initiation of autocatalytic, destructive lipoperoxidation by CCl_4. It is suggested that free radicals from the CCl_4 cleavage attack the methylene bridges of the unsaturated fatty acid side chains of the endoplasmic reticulum of the hepatic parenchymal cells and set off autocatalytic chains of peroxidative lipid decomposition which lead eventually to the well-known pathology of CCl_4 poisoning.

A66-81921
CONTROL OF TIME ESTIMATION BY A CHEMICAL CLOCK.
C. R. Bell (London School of Hyg. and Trop. Med., Med. Res. Council Environ. Physiol. Res. Unit, London, Great Britian).
Nature, vol. 210, Jun. 11, 1966, p. 1189–1190. 6 refs.

Two series of experiments were performed in which subjects' speed of counting at a rate estimated to be one digit/sec. and speed of tapping at an estimated rate of three taps/sec. was compared with increase in oral body temperature (of 0.4–1.2°C. by immersion of the legs in warm water). There was no significant correlation between the extent of rise in oral temperature and the magnitude of change in time estimation performance. It is therefore suggested that man's control of time estimation of short intervals by a chemical clock is untenable.

A66-81922
THE UPTAKE AND RELEASE OF SO_2 BY THE HUMAN NOSE.
Frank E. Speizer and N. R. Frank (Harvard School of Public Health, Dept. of Physiol., Boston, Mass.)
(Am. Physiol. Soc. Proc., Providence, R. I., Sep. 8–11, 1964). Archives of Environmental Health, vol. 12, Jun. 1966, p. 725–728. 16 refs.
Grants PHS OH 00100 and 2G-409.

Measurements were made of the absorption and desorption of 1% sulfur dioxide in the upper respiratory tracts of seven healthy men breathing by nose. Virtually all of the inspired sulfur dioxide was adsorbed by the nasal mucosa. It was not possible to saturate the system during the period of study at the concentration used. During expiration sulfur dioxide was desorbed from the nasal mucosa in quantities which totalled approximately 15% of the original concentration inspired. An implication of this study is that chemically minute amounts of sulfur dioxide (less than 1% of the inspired concentration) are, upon reaching the larynx and more distal airways, sufficient to initiate reflex changes in bronchomotor tone.

A66-81923
RESPIRATORY ABSORPTION DATA AND SO_2 DOSE-RESPONSE CURVES.
Mary O. Amdur (Harvard School of Public Health, Dept. of Physiol., Boston, Mass.)
Archives of Environmental Health, vol. 12, Jun. 1966, p. 729–732. 9 refs.
Grant PHS 00084.

Data published by Strandberg (1964) on the decreased upper respiratory absorption in rabbits of sulfur dioxide with decreasing air concentrations were applied to the dose-response curve using the increase in pulmonary flow-resistance in guinea pigs as the response. This calculated "lung" dose-response curve is a straight line over a range of 0.16–835 p.p.m. air concentrations of sulfur dioxide. Strandberg's data are also used to explain the fact that the presence of a tracheal cannula does not lead to a greater response at low concentrations, whereas at high concentrations the response of the cannulated animals is greater than that of the animals breathing normally. The values obtained experimentally using animals with tracheal cannulas and the calculated "lung" dose-response curve appear to agree.

A66-81924
PHYSIOLOGIC RESPONSES OF THE ALBINO RAT TO CHRONIC NOISE STRESS.
William F. Geber, Thomas A. Anderson, and Bruce Van Dyne (S. Dak. U., Med. School, Dept. of Biochem. and Dept. of Physiol. and Pharm., Vermillion).
Archives of Environmental Health, vol. 12, Jun. 1966, p. 751–754. 12 refs.

There was a marked decrease in both adrenal ascorbic acid and eosinophil level in rats as a response to noise stress (identical acoustical profile, but with acute (15–270 min.), intermediate (24–96 hr.), or chronic (3 wk.) exposure). In another series of experiments, adrenal and brain ascorbic acid, adrenal weight, and serum cholesterol were followed for

24–96 hr. (intermediate period) or 21 days (prolonged period) following acoustical stress. At the end of the intermediate period, three values were increased, but adrenal ascorbic acid was decreased. After 21 days, the measured parameters were still responding to the audiogenic stress.

A66-81925
PREPARATION OF MAN FOR TRAVEL INTO SPACE.
W. H. Johnson and P. E. Ireland (Toronto U., Dept. of Otolaryngol., Canada).
Royal Society of Medicine, vol. 59, Mar. 1966, p. 277–280. 7 refs.

Man's preparation for long hazardous voyages into space must of necessity require as full an understanding as possible of all the effects of this completely new environment on his physiological processes. We now have ample evidence for believing that of all the various disturbing stimuli to which space travellers will be exposed, the disabling effects of angular and linear accelerations on the non-auditory labyrinth can reduce an astronaut's efficiency to such an extent as to jeopardize his very survival. These undesirable effects could arise not only from resulting vertigo and nausea, but also from other incapacity, such as cardiovascular insufficiency, resulting from strong vestibular disturbances, a full understanding of which merits intensive research in this challenging field of space medicine.

A66-81926
TISSUE DESTRUCTION BY LASER ENERGY, ITS MANAGEMENT AND PREVENTION.
John Peter Minton (Ohio State U. Hosp., Dept. of Surg., Columbus).
(Am. Assn. for Surg. of Trauma, 25th Ann. Session, Philadelphia, Oct. 14–16, 1965).
Journal of Trauma, vol. 6, Mar. 1966, p. 262–266; discussion, p. 266–267. 10 refs.

The unique characteristics of photon energy from lasers has made this source of energy an attractive new tool in many areas of research and development. An increase in laser injuries is anticipated. Injuries from pulsed and continuous laser beams are discussed and methods for the management and prevention of such injuries are presented.

A66-81927
KINETICS OF CALCIUM METABOLISM.
G. L. Alonso, J. M. Nikonov, R. J. Mestorino, and R. Calvi (Buenos Aires U., Fac. de Odontol., Cátedra de Fisiol., Argentina).
Acta Physiologica Latino Americana, vol. 15, no. 4, 1965, p. 333–343. 14 refs.

A new method is proposed for calculation of bone accretion rate (A), exchangeable bone fraction size (E), and radiocalcium reabsorbed from bone (Ca^{45}_{rbt}); with the purpose of avoiding the inaccuracy introduced when general methods are used to solve the equation proposed by Bauer, Carlsson, and Lindquist (1955). In an experiment on rats using Ca^{45} as tracer, the results agree with Bauer, Carlsson, and Lindquist suppositions about the existence of small amounts of Ca^{45} reabsorbed from bone a short time after injection; but disagree about similarity of specific activities between plasma and exchangeable bone at the same periods. From this unlikely result, bone accretion rate was calculated bigger than 300%, exchangeable bone fraction size bigger than 1400%, and total amounts of Ca^{45} reabsorbed from bone smaller than 1%, than the calculated values by the original method.

A66-81928
CIRCULATORY RESPONSE TO EXERCISE IN VAGOTOMIZED DOGS WITH PARTIAL SYMPATHECTOMY.
E. Ashkar (Inst. de Biol. y Med. Exptl., Buenos Aires, Argentina).
Acta Physiologica Latino Americana, vol. 15, no. 4, 1965, p. 344–350. 6 refs.
Grant PHS CA-04745-05.

Seven sympathectomized, bilaterally vagotomized dogs in which the left stellate ganglion was left intact, were run on a motor-driven treadmill at 7.5 km./hour and 10% grade. The results were compared to those obtained in normal animals. Mean arterial blood pressure decreased about 16% after 10 minutes exercise in denervated dogs, whereas heart rate rose approximately 28%. Cardiac output (Direct Fick) increased 80% compared to the normal dog in which it trebled. In both groups, oxygen consumption, stroke volume, and total peripheral resistance underwent similar changes. The increase in cardiac output of denervated dogs was equally attributed to increases in stroke volume and heart rates, whereas in control dogs the heart rate factor was considered to predominate.

A66-81929
CIRCULATORY CHANGES DURING EXERCISE, IN DENERVATED DOGS WITH INTACT SPLANCHNIC NERVES.
E. Ashkar (Inst. de Biol. y Med. Exptl., Buenos Aires, Argentina).
Acta Physiologica Latino Americana, vol. 15, no. 4, 1965, p. 351–356. 10 refs.
Grant PHS AM 08307-06 END.

Six bilaterally vagotomized dogs, with removal of both sympathetic chains from T-I to T-VII and from L-I to the last lumbar segment were run on a motor-driven treadmill at 7.5 km./hr. and 10% grade. After ten minutes of exercise, cardiac output (Direct Fick) increased about 160%. This effect was due principally to increases in stroke volume (100%) since cardiac acceleration was less important (28%). The changes of oxygen consumption, total peripheral resistance, and mean aortic blood pressure were generally similar to those known to occur in normal dogs performing at equal speed and grade.

A66-81930
AUDITORY INTENSITY PERCEPTION AND NEURAL CODING.
Richard A. Campbell (Western Reserve U., Cleveland, Ohio).
Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1030–1033. 14 refs.
PHS and NSF supported research.

Threshold signal-to-masker ratios for three sinusoids (250, 1000, and 4000 Hz.) presented in a masker of corresponding frequency set to various levels were gathered and are presented. The masker was either continuous or pulsed-on-only during both signal intervals. The block up-and-down, two-interval, forced-choice psychophysical procedure was used. The relation between the obtained thresholds, and (1) the level of the masker, (2) whether the masker was continuous or pulsed, and (3) other previously reported data for noise signals and maskers are especially considered. A discussion of these data as reflecting auditory nerve activity, loudness adaptation, increase of uncertainty, and/or a "drifting filter" is offered.

A66-81931
BINAURAL MASKING OF SPEECH BY PERIODICALLY MODULATED NOISE.

Raymond Carhart, Tom W. Tillman, and Kenneth R. Johnson (Northwestern U., Auditory Res. Lab., Evanston, Ill.)
Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1037–1050. 16 refs.
PHS supported research.

The interference with intelligibility of monosyllabic words produced by continuous white noise, by modulated white noise, and by continuous speech (single talker) was studied during homophasic (NOSO) and antiphasic (NπSO) listening. Five signal-to-masker ratios, four modulation rates, and four magnitudes of modulation were used. Reception in the continuous noise was characterized by steeply sloping intelligibility functions and a 4.5-dB. masking-level difference favoring antiphasic listening. Reception in modulated noise changed with the rate and depth of modulation. A 7-dB. modulation yielded intelligibility functions highly comparable to those for continuous noise having the same average level. By contrast, more extreme modulation (14, 21 dB., and complete interruption) produced better intelligibility under both homophasic and antiphasic conditions than did continuous noise. This effect was particularly great when noise was completely interrupted either 4 or 20 times/sec. under which circumstances intelligibility remained above 80% in a speech-to-noise ratio of −24 dB. The advantage of antiphasic over homophasic listening, or masking-level difference, was fairly similar for all conditions of modulated noise, averaging 3.9 dB. When the masking signal was a single competing talker, the antiphasic advantage dropped to 3.3 dB., and the intelligibility function did not duplicate any of the functions obtained in white noise, either continuous or modulated. Nonetheless, individual sets of conditions occurred where masking by speech and by modulated noise yielded equivalent performance, but the depth of modulation required for this equivalence varies with the speech-to-masker ratio being employed.

A66-81932
FEEDBACK AND PSYCHOPHYSICAL VARIABLES IN SIGNAL DETECTION.
Edward C. Carterette, Morton P. Friedman, and Melvin J. Wyman (Calif. U., Los Angeles).
(Acoust. Soc. of Am., 66th Meeting, Ann Arbor, Mich., Nov. 6–9, 1962).
Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1051–1055. 19 refs.
NASA, ONR, and PHS supported research.

One hundred forty-four observers divided into eight groups of 18 each, were run in a two-alternative, temporal, forced-choice auditory-signal-detection task. At each of two signal intensities, four levels of information feedback were used: no feedback (NF), correct feedback on every trial (F100), on three-fourths (F75), or half (F50) of the trials, with incorrect feedback on remaining trials. The results were that (a) NF and F100 led to higher probability of correct responding, P(C), than either F75 or F50 for both signal intensities; (b) P(C) for NF was higher under the higher intensity but lower under the lower intensity than for F100; (c) on trials immediately following trials on which observer's response and feedback agreed, detection rates were higher and false-alarm rates were lower than following disagreement trials, whereas these differences were close to zero for F50. It is argued that feedback leads the observer to change his criterion following disagreements. The effect of this variability is to depress the mean detectability index d' of signal-detectability theory.

A66-81933
PHYSIOLOGICAL CORRELATE OF TONAL MASKING.
Alfred Finck (Temple U., School of Med., Auditory Res. Lab., Philadelphia, Pa.)
(Acoust. Soc. of Am., 69th Meeting, Washington, D. C., Jun. 25, 1965).
Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1056–1062. 10 refs.
PHS supported research.

A gross, slow potential that is differentially sensitive to the frequency of a tone burst was recorded from the region of the auditory nerve in the hamster. An experimental paradigm similar to that employed in psychological studies of tonal masking was used to measure neural-response amplitude change in the presence of a second tone. The influence of one tone upon the other, as evidenced by the neural response, yielded functions similar to the masking curves generated by human listeners. Increases in the level of the signal required increases in the level of the masker in order to maintain the masking criterion. High-tone maskers were less effective than low-tone maskers. Masking was viewed as a preempting of neural activity by the secondary tone.

A66-81934
INTERACTIONS BETWEEN SYNCHRONOUS NEURAL RESPONSES TO PAIRED ACOUSTIC SIGNALS.
Donald C. Teas (Pittsburgh U., School of Med. and Eye and Ear Hosp., Bioacoustics Lab., Pa.)
Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1077–1085. 18 refs.
PHS supported research.

Brief tone pips were used as stimuli in two-signal interference experiments to provide a basis for interpretation of intensity functions. Whole-nerve action-potential responses were recorded from the cochlea (guinea pig). Stimulation by a 6-kc.p.s. pip interferes with the response to a 2-kc.p.s. pip only when the latter reaches a magnitude (baseline-peak measure) of 30–40 V, about 18 dB. above a just-detectable response. Interference depends more upon the strength of the 2-kc.p.s. pip than upon the strength of the 6-kc.p.s. pip. The form of intensity functions for low-frequency signals show less spatial change. The data suggest that there are two response modes for neural activity elicited by acoustic signals. For high-frequency signals, synchrony of excitation depends upon envelope and there is little change in location of excitatory region along the cochlear partition with signal strength. For low-frequency signals, synchrony depends upon the locations along the cochlear partition that exceed a critical amplitude, i.e., upon the velocity of the traveling wave. Broad-band transient signals, such as clicks, may elicit neural activity in both response modes.

A66-81935
ELECTROPHYSIOLOGICAL ANALOG OF THE INTERAURAL TIME-INTENSITY TRADE.
Frederic G. Worden, James T. Marsh, and Frederick J. Bremner (Calif. U., Center for the Health Sci., Dept. of Psychiat. and Brain Res. Inst., Los Angeles).
Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1086–1089. 12 refs.

Variations in the amplitude and polarity of evoked potentials with differences in intensity and arrival time of clicks delivered to the two ears were recorded from the superior-olivary nucleus in cats with chronically implanted electrodes. An analog of the "time-intensity" trade was seen in the cancellation of evoked potentials when time and intensity differences were opposed.

A66-81936

NORMAL HEARING THRESHOLD DETERMINED BY MANUAL AND SELF-RECORDING TECHNIQUES.

J. J. Knight (London U., Inst. of Laryngol. and Otol., Great Britain).

Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1184–1185. 8 refs.

Data are presented relating to the thresholds of three different samples of normally hearing subjects, which indicate that the British standard and recommended International Standardization Organization reference zero for audiometers is insufficiently stringent by approximately three dB. over the frequency range 0.5 to 6 kc.p.s. Determinations of threshold, made with the same audiometer and the same earphone placement, by a conventional manual method and by a self-recording method showed the latter to give an average threshold more sensitive than the manual usage gave by less than 1 dB. The inaccurate nature of current procedures for audiometer calibration employing a single subjective correction for all receivers of a particular pattern is stressed.

A66-81937

NORMAL THRESHOLD OF HEARING FOR PURE TONES BY EARPHONE LISTENING WITH A SELF-RECORDING AUDIOMETRIC TECHNIQUE.

C. G. Rice and R. R. A. Coles (Southampton U., Inst. of Sound and Vibration Res., Audiol. Group, Hampshire, Great Britain).

Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1185–1187. 14 refs.

Two independent series of measurements of normal auditory threshold were carried out with fixed-frequency self-recording audiometers. The results are in close agreement with each other, but yield threshold levels that are distinctly more acute than the International Standard reference levels (ISO-R.389: 1964), the exact difference varying somewhat according to different methods of application of the standard to IDH-39: MX-41/AR earphones. Possible reasons for the more-acute thresholds are discussed.

A66-81938

EFFECTS OF BANDPASS-FILTERED NOISE UPON THE INTELLIGIBILITY OF FILTERED SPEECH.

Sadanand Singh (Ranchi U., India), Sonia P. Brokaw (Ohio State U., Columbus), and James E. Fricke (Minot State Coll., N. Dak.)

Journal of the Acoustical Society of America, vol. 39, Jun. 1966, p. 1189–1190. 6 refs.

PHS supported research.

Intelligibility scores were obtained from 240 listeners for monosyllabic words. In experiment one, noise was introduced at the lowest end of the spectrum and, in experiment two, at the highest. Throughout the listening task, speech was presented through one of four "equally contributing intelligibility bands" (quarter-bands) of the speech spectrum: 300–760, 760–1450, 1450–2550, and 2550–7000 c.p.s. Intelligibility in the channels (quarter-bands) at the opposite ends from the noise was superior in the experimental condition to that in the control, the control being characterized by no introduction of noise. Thus, effects similar to previously reported studies of release from masking were evident.

A66-81939

INHIBITION OF PHOTOPHOSPHORYLATION AND PHOTOSYNTHETIC CARBON CYCLE REACTIONS BY FATTY ACIDS AND ESTERS.

T. A. Pedersen, Martha Kirk, and J. A. Bassham (Calif. U., Lawrence Radiation Lab., Chem. Biodyn. Div., Berkeley).

Biochimica et Biophysica Acta, vol. 112, Feb. 7, 1966, p. 189–203. 20 refs.

AEC supported research.

Photosynthesis in *Chlorella pyrenoidosa* is quickly inhibited by the addition of 3×10^{-4} to 6×10^{-4} M lipoic acid, octanoic acid, or methyl octanoate. These inhibitions are wholly or partially reversible. Studies with ^{32}P-labeled phosphate and ^{14}C-labeled carbon dioxide of transient changes in the levels of photosynthetic intermediate compounds during the time following addition of inhibitor indicate blocking of (1) the carboxylation reaction of the photosynthetic carbon reduction cycle, (2) photophosphorylation (formation of adenosine triphosphate in the light), and (3) conversion of fructose-1,6-diphosphate to fructose-6-phosphate and of sedoheptulose-1,7-diphosphate to sedoheptulose-7-phosphate. Blocking of photophosphorylation results in decreased rates of conversion of ribulose-5-phosphate to ribulose-1,5-diphosphate, of glucose-6-phosphate to polysaccharides and sucrose, and other reactions. These metabolic effects, together with other published results, lead us to conclude that at least several key steps in the photosynthetic carbon reduction cycle may be mediated by enzymes in some organized system associated with the lamellae and photophosphorylation.

A66-81940

A MODEL FOR THE PHOTOSYNTHETIC UNIT: PHOTOCHEMICAL AND SPECTRAL STUDIES ON PHEOPHYTIN a ADSORBED ONTO SMALL PARTICLES.

Richard A. Cellarius and David Mauzerall (Rockefeller Inst., New York, N. Y.)

(Biophys. Soc., 9th Ann. Meeting, Feb. 1965).

Biochimica et Biophysica Acta, vol. 112, Feb. 7, 1966, p. 235–255. 54 refs.

As an approach to understanding the influence of chloroplast structure on the photochemical reactions of photosynthesis, the effect of both surface concentration and nature of surface adsorption, fluorescence and sensitized dye reduction properties of pheophytin a adsorbed to small particles was studied. At very low surface concentrations on non-polar polystyrene particles, all spectral evidence indicates the pheophytin is monomeric, and the quantum yield of photosensitization is approximately that of pheophytin in solution. The yield falls to half this value only when 50% of the surface is covered. However, the fluorescence is half-quenched at 3% coverage. At high coverage the broadening of the spectra indicates aggregation of the pheophytin. The quenching of monomer fluorescence is accounted for by energy transfer to the very weakly fluorescent aggregates, the number of which is estimated by a one-dimensional Ising model. Analysis shows that small aggregates on the polystyrene must be photoreactive. On a polar surface (zeolite particles) the absorption spectra are always broadened and the fluorescence yield is low for all coverages. The photochemical activity increases with increasing coverage, but at best only reaches the low yield of the 100%-coverage polystyrene. Thus the surface can have a profound effect on the observable excited states of the adsorbed pigment. The polystyrene particle model has properties strikingly similar to those of the photosynthetic unit. They are both photochemically active at high pigment concentration. Both show excitation energy transfer to active traps. It should be possible to build a more efficient reaction site with this model system.

A66-81941

URINARY CALCIUM RESPONSE TO CHRONIC PARATHYROIDECTOMY IN RATS.

Alexander D. Kenny (W. Va. U., Med. Center, Dept. of Pharmacol., Morgantown).
Endocrinology, vol. 79, Jul. 1966, p. 77–80. 18 refs.
Grants PHS AM-04276 and FR-05433-04.

In rats maintained on a normal diet parathyroidectomy resulted in a hypercalciuric response which persisted for periods up to four weeks. In view of the marked hypocalcemia existing throughout the four-week period, it is concluded that removal of the parathyroids results in a chronic increase in calcium clearance. Serum magnesium and inorganic phosphate data are also reported. Chronic parathyroidectomy resulted in the expected fall in urinary inorganic phosphate. Serum magnesium fell following parathyroidectomy; urinary magnesium levels were unaffected by the operation.

A66-81942
STUDIES OF THYROCALCITONIN ACTION.
Arthur Chausmer, Richard Mittleman, and Stanley Wallach (N.Y. State U., Downstate Med. Center, Dept. of Med., Brooklyn and Will Rogers Hosp., Summer Res. Inst., Saranac Lake, N. Y.)
Endocrinology, vol. 79, Jul. 1966, p. 131–137. 17 refs.
Grant PHS 2A-5347 and Ayerst Labs. supported research.

The hypocalcemic activity of thyroid extracts of hog, dog, lamb, deer and human origin were tested in Holtzman and wistar rats and in dogs. All extracts except those of human origin were highly potent in Holtzman rats, reducing the plasma calcium concentration by an average of 0.8 to 1.0 mEq./1. The dog, deer, and lamb extracts were comparably potent in Wistar rats but hog thyroid extracts gave variable responses. Similarly prepared extracts of eight other dog tissues had no hypocalcemic activity in Holtzman rats. Adjustment of the pH of the thyroid extracts to 7.4 decreased their protein content from 7.0 to 3.5 mg./ml. without loss of potency. In dogs, the animal thyroid extracts caused decreases in the plasma calcium concentration of 0.3 to 0.8 mEq./1. and extracts of human thyroid were ineffective. Repeated administration of hog thyroid extracts, but not of extracts from other animal sources, caused progressively smaller decreases in the plasma calcium concentration. In the dog, the hypophosphatemic activity of thyroid extracts generally paralleled the hypocalcemic activity but no consistent effects on plasma magnesium concentrations occurred.

A66-81943
ENDOGENOUS THYROCALCITONIN: EFFECT ON SERUM CALCIUM IN FED AND FASTED RATS AND IN PARATHYROID TRANSPLANTED RATS.
Emily R. Morey (Pittsburgh U., School of Med., Dept. of Pharmacol., Pa.)
Endocrinology, vol. 79, Jul. 1966, p. 191–196. 13 refs.
Grant NIH FR 05116 01.

Earlier work in this laboratory suggested that the decrease in serum calcium seen after thyroid cautery in rats might be due in part to an interference with parathyroid function and not solely to a release of thyrocalcitonin from the thyroid gland. To determine the validity of such a suggestion, experiments were performed on rats in which the parathyroid glands had been autotransplanted to the sternomastoid muscle in the neck. Approximately 14 days after transplantation, rats with functional transplants were subjected to bilateral cautery of either the thyroid gland or the sternohyoid muscle. Bilateral thyroid cautery in parathyroid transplanted rats caused a dramatic decrease in serum calcium one hr. after cautery, with the maximum hypocalcemic response occurring six hr. after the operation. Approximately seven hr. after initiation of the experiment, the calcium level began to rise and within 24 hr. it had returned to normal. No significant change in serum calcium was seen after bilateral cautery of the sternohyoid muscle in control parathyroid transplanted rats. These results prove conclusively that bilateral thyroid cautery in parathyroid transplanted rats induces a hypocalcemic response irrespective of any interference with parathyroid function. The influence of fasting vs. feeding on the response of the serum calcium to electrocautery of the thyroid gland or the parathyroid glands in rats was also explored.

A66-81944
SECRETION OF ELECTROLYTES IN SWEAT DURING THE INITIAL PHASE OF FUNCTION OF THE SWEAT GLANDS [WYDZIELANIE ELEKTROLITOW W POCIE WE WSTEPNEJ FAZIE CZYNNOSCI GRUCZOLOW POTOWYCH].
Stanislaw Nowak and Jan Zazgörnik.
Acta Physiologica Polonica, vol. 17, May–Jun. 1966, p. 395–404. 14 refs. In Polish.

Experiments performed in a thermal chamber on 34 healthy volunteers showed that the concentration of sodium chloride increased in thermal sweat 10–15 minutes after the beginning of sweating. In the last sweat fractions the concentration of NaCl was 4–6 times as high as in the first fractions. Faster rise in Na concentration which could be expected if the rise in NaCl concentration were a result of retardation of reabsorption of the salt was not observed. Marked individual variation in the concentration of NaCl in the first sweat fraction and in the rate of its increase in later phases was noted. Concentrations of potassium in sweat also showed changes (2.1–11.3 mEq/l.) although not as clearly as Na and Cl. Experiments with sweat centrifuged immediately after collection showed that these variations were not caused by liberation of K from desquamated epithelium. No contrast was observed between the secretion of Na and K in sweat.

A66-81945
CONTENT OF SOME OF THE GROUP B VITAMINS IN HUMAN BLOOD DEPENDING ON THE CHARACTER OF MUSCULAR WORK [BADANIA ZAWARTOSCI NIEKTORYCH WITAMIN GRUPY B W KRWI LUDZKIEJ W ZALEZNOSCI OD CHARAKTERU PRACY MIESNIOWEJ].
Feliks Nijakowski.
Acta Physiologica Polonica, vol. 17, May–Jun. 1966, p. 477–486. 27 refs. In Polish.

Changes in concentrations of thiamine, pantothenic acid, and biotin in relation to the character of muscular work were studied in athletes. The following types of physical exertion were studied: six min. of work on cycloergometer; four-hour skiing excursion in the mountains; and daily training in skiing during three weeks at a mountain camp. The experiments were carried out on 13 students of the School of Physical Education in Poznan. Employing microbiologic methods, concentrations of the vitamins were determined in the blood before and after physical exertion. Physiologic norms of vitamin concentrations were determined in 12 sedentary males (control group). Statistical analysis of the results showed: (1) lower blood thiamine levels in sportsmen than in the control group; decrease in the levels of this vitamin in athletes after four-hours of exertion and after five weeks in the training camp; (2) higher concentrations of pantothenic acid in the blood of sportsmen compared with the control group, and decreased levels after six minutes of exertion; and (3) unchanged concentrations of biotin in the blood of the athletes after physical exertion of different degrees.

A66-81946
EFFECTS OF VERY LOW FREQUENCY TONES ON AUDITORY THRESHOLDS.
J. Jerger, B. Alford, A. Coats (Baylor U., Coll. of Med., Houston, Tex.), and B. French (NASA, Manned Spacecraft Center, Houston, Tex.)
Journal of Speech and Hearing Research, vol. 9, Mar. 1966, p. 150–160.
NASA Contract NAS9-2468.

Nineteen human subjects were exposed to repeated three-minute tones in the sound pressure level range from 119 to 144 dB. and the frequency range from 2-22 c.p.s. The tones were produced in an acoustic test booth by a piston-cylinder arrangement driven by a variable speed direct current motor. Eight subjects showed no adverse effects. Temporary threshold shifts (TTS) of 10 to 22 dB. in the frequency range from 3,000 to 8,000 c.p.s. were observed in the remaining 11 subjects. In addition, the seven and twelve c.p.s. signals produced considerable masking over the frequency range from 100 to 4,000 c.p.s.

A66-81947
THE INFLUENCE OF INHALATION OF CARBON DIOXIDE ON CHICKENS, INCLUDING RESISTANCE TO INFECTION WITH NEWCASTLE DISEASE VIRUS.
D. P. Anderson, C. W. Beard, and R. P. Hanson (Wis. U., Dept. of Vet. Sci., Madison).
Avian Diseases, vol. 10, May 1966, p. 216–224. 15 refs.
USDA supported research.

Chickens and turkeys exposed continuously to 5,000 p.p.m. (0.5%) of carbon dioxide for eight weeks showed no gross or microscopic signs of damage to the respiratory tract. There were no significant differences in weekly weight gains or feed conversion ratios between birds exposed to CO_2 for varying periods followed by exposure to an aerosol of Newcastle disease virus (NDV) exhibited a prolonged mean death time in only one of six trials when compared to control birds receiving only the aerosol of NDV.

A66-81948
TRENDS IN THE THERAPY OF ACUTE POISONINGS.
R. E. Gosselin and Roger P. Smith (Dartmouth Med. School, Dept. of Pharmacol. and Toxicol., Hanover, N. H.)
Clinical Pharmacology and Therapeutics, vol. 7, May–Jun. 1966, p. 279–299. 61 refs.
Grants PHS AC-00211, GM-11598, and AP-00260.

A discussion is presented of many new and old techniques for preventing and treating poisonings arising from the ingestion of substances against which no specific antidotes are established. Aside from symptomatic and general supportive care, the nonspecific measures of value in clinical toxicology are of two types: those employed to minimize absorption by terminating the toxic exposure and those designed to promote the excretion of poisons already absorbed. In the first category, the induction of emesis, gastric lavage, the ingestion of adsorbents, and the administration of cathartics are recognized. In the second category are techniques for accelerating renal and biliary excretion, as well as extracorporeal hemodialysis, peritoneal dialysis, gastric dialysis, and related procedures. Considerably more information is desirable about each of these measures, how and when it should be used, and what advantages and disadvantages can be anticipated in its adoption. On the basis of recent studies, specific topics of promise for future investigation are suggested. Developments in these areas will probably prove to be more important than new systemic antidotes in terms of improving patient care in clinical toxicology.

A66-81949
THE EFFECTS OF D-AMPHETAMINE ON ERRORS AND CORRECT RESPONSES OF HUMAN BEINGS PERFORMING A SIMPLE INTELLECTUAL TASK.
Audrey R. Holliday (Wash. U., Dept. of Pharmacol., Seattle).
Clinical Pharmacology and Therapeutics, vol. 7, May–Jun. 1966, p. 312–322. 13 refs.
(Grant NIMH MY-3311; Dorsey Labs., Merck Sharp and Dohme Res. Labs., Upjohn Co., Wallace Labs., and Winthrop Labs. supported research.

Human subjects performing under the treatment condition of a single dose of 10 mg. of d-amphetamine not only solved a statistically significantly higher number of problems (adding and subtracting signed numbers) correctly than did subjects serving under a placebo treatment condition, but also made a statistically significantly lower percentage of errors. Subjects ingesting 10 mg. of d-amphetamine did not solve more problems correctly simply because they attempted more problems. They solved more problems correctly because they made proportionately fewer errors than did subjects ingesting a placebo. Fatigued subjects who had ingested 10 mg. of d-amphetamine did not show the degree of decrement in performance shown by fatigued subjects who had ingested a placebo. Therefore, in comparison with the effect on the performance of the ingestion of a placebo by subjects whose performance had been degraded by a moderate amount of fatigue and who were then set to a continuous task, the ingestion of d-amphetamine enhanced performance. This is not to imply that d-amphetamine enhances performance under the conditions of this study in the sense of significantly raising above the predrug level the number of problems correctly solved.

A66-81950
TISSUE OXYGEN CONSUMPTION IN THE HIBERNATING AND ACTIVE BAT MYOTIS LUCIFUGUS.
David S. Bruce and Jacob E. Wiebers (Purdue U., Dept. of Biol. Sci., Lafayette, Ind.)
Physiological Zoology, vol. 39, Jul. 1966, p. 237–243. 23 refs.
Grant NIH GM-10811 and Purdue Res. Found. supported research.

The rate of oxygen consumption (Q_{O_2}) was determined by the method of Warburg for brain, heart, liver, skeletal muscle, and brown fat from winter-hibernating and summer-active little brown bats at temperatures of 16°C. and 35°C. Oxygen-consumption rates in hibernating-bat brain were slightly lower than rates in active-bat brain at both temperatures. The rate of oxygen consumption in cardiac tissue from the hibernating bat was slightly depressed from its rate in active bat, measured at 35°C. Hibernating-bat heart Q_{O_2} was greater than that from the active bat at 16°C. This may have resulted from an increase in substrate concentration (i.e., glycogen) or enzyme activity at the lower temperature. There was a depression in Q_{O_2} in hibernating-bat liver, especially at 35°C, as compared with liver of active bats. Skeletal-muscle Q_{O_2} was significantly higher in the hibernating than in the active bat at both 16° C. and 35° C., suggesting increased glycogen levels in hibernation. These possible glycogen increases in hibernating heart and skeletal muscle may have come at the expense of liver glycogen. Oxygen consumption in hibernating-bat skeletal muscle was greater at 16°C. than at 35°C. and may have been due to changes in substrate concentration or enzyme activity, as in cardiac tissue. Brown fat had the highest metabolic rate of all tissues studied. Its high rate of metabolism was depressed very little in hibernation, at either 35°C. or 16°C. These findings substantiate proposals by others that brown fat is a prime heat source during the arousal process. It is concluded from this investigation

that substrate concentration or enzyme activity is increased in tissues of the hibernating bat, as indicated by in vitro oxygen consumption rates. Sources of potential energy exist, although gross metabolic rate is depressed.

A66-81951
EFFECTS OF RADIANT HEAT ON DIFFERENT REGIONS OF THE BODY. NOTE 3. EFFECTS OF INFRARED IRRADIATION OF DIFFERENT BODY REGIONS IN ACCLIMATIZED AND NON-ACCLIMATIZED SUBJECTS, ON CARDIOVASCULAR AND RESPIRATORY FUNCTIONS, OXYGEN CONSUMPTION, AND CUTANEOUS AND ORAL TEMPERATURES [SUGLI EFFETTI DEL CALORE RADIANTE SU REGIONI DIVERSE DEL CORPO UMANO NOTA 3—COMPORTAMENTO DELL'ATTIVITA CARDIOCIRCOLATORIA, RESPIRATORIA, DEL CONSUMO DI OSSIGENO E DELLA TEMPERATURA ORALE E CUTANEA DURANTE IRRADIAZIONE INFRAROSSA DI REGIONI DIVERSE IN SOGGETTI ACCLIMATATI E NON].
V. Wyss (Torino U., Ist. di Fisiol. Umana, Italy).
Medicina del Lavoro, vol. 57, Apr. 1966, p. 262–285. 37 refs. In Italian.

The effects of intensive heat irradiation of the face or equivalent surfaces of the thorax or abdomen (0.44 Cal./cm.^{2}/sec. for 20 minutes) on cardiovascular activity (by means of electrocardiograms (ECG) and blood pressure measurements), and respiratory function (by measuring oxygen consumption and registering the pulmonary ventilation) were investigated in six acclimatized and six non-acclimatized subjects. The pulse rate was slightly raised in non-acclimatized subjects, while it was unchanged in the acclimatized ones. Neither group showed any modifications in the E.C.G.'s, or blood pressure, or pulmonary ventilation values; there were no differences related to the different body regions irradiated. The skin temperature on the face and hands both during and after irradiation was always higher than the initial temperature before irradiation, while in the posterior cervical region the temperature was always lower than the one present prior to irradiation. During irradiation the oral temperature rose by 0.6 to 0.8°C. A rise in temperature of 0.6°C. was also demonstrated in the irradiated region, to a depth of 18 mm. During the application of infrared heat to the abdomen the non-acclimatized subjects complained of extrasystole, abdominal pain, increased peristaltic activity with tenesmus, and above all sleepiness. Two subjects presented the symptoms and signs of shock, with loss of consciousness. Some practical measures for the prevention of disturbances caused by radiant heat are discussed.

A66-81952
HYPOXIC THRESHOLD OF THE ERYTHROPOIETIC RESPONSE IN THE RAT [UMBRAL DE HIPOXIA DE LA RESPUESTA ERITROPOYETICA EN LA RATA].
J. L. Scaro (U. Nacl. de Tucumán, Inst. de Biol. de la Altura, San Salvador de Jujuy, Argentina).
Revista española de Fisiologia, vol. 21, no. 2, 1965, p. 49–54. In Spanish.

The hypoxic threshold of the erythropoietic response in the rat was investigated. The effects on the blood volume of long-term residence at different altitudes above sea level and the effects of acute exposure to the same degrees of hypoxia upon the plasma iron half-life were studied by iron-59. The results in both series of experiments prove that falls in the O_2 tension which take place at altitudes between 2000 and 2350 meters above sea level are able to cause the erythropoietic response as seen through the decrease of the plasma iron half-life and the increases of the blood volume which took place at those altitudes.

A66-81953
SUBCLAVIAN VEIN CATHETERIZATION: A TECHNIQUE FOR MONITORING CENTRAL VENOUS PRESSURE.
Perry Dornstein (Albert Einstein Med. Center, Dept. of Med., Philadelphia, Pa.) and Nathaniel G. Berk.
Journal of the Albert Einstein Medical Center, vol. 14, Jul. 1966, p. 257–265. 40 refs.
Grant Albert Einstein Med. Center N-346.

Subclavian catheterization was performed in 40 subjects. Its technique and use are described. A brief review of the literature is given. Central venous pressure monitoring was found to be indispensable in the management of various urgent clinical situations.

A66-81954
THE EFFECT OF BETA-ADRENERGIC BLOCKING SUBSTANCES ON MUSCLE BLOODFLOW IN MAN.
W. Schoop and I. Schmidtke (Freiburg i. Br., Med. U. Clin., West Germany).
Angiologica, vol. 3, no. 3, 1966, p. 141–152. 25 refs.
Deut. Forschungsgemeinschaft supported research.

In 48 males with a normal circulatory system muscle bloodflow (calf or forearm) was registered continuously using the thermocouple probe (Hensel) or measured by a venous occlusion plethysmograph. The measurements were taken at rest and during exercise. After intra-arterial (i.a.) injection of the beta-adrenergic blocking substance propranolol there was a transitory increase of the muscle bloodflow, after intravenous (i.v.) injection sometimes a small decrease. The spontaneous changes and the reactive increase of flow to psychological and cold stimuli were almost not influenced. However, the prior vasodilation after small doses of adrenaline (i.a. or i.v.) was abolished.

A66-81955
EFFECT OF WHOLE-BODY IRRADIATION ON BARBITURATE METABOLISM IN SUCCESSIVE GENERATIONS OF MICE.
A. E. Wade and H. C. Ansel (Ga. U., School of Pharm., Athens).
Archives internationales de Pharmacodynamie et de Thérapie, vol. 162, Jul. 1966, p. 104–113. 23 refs.
Ga. U. supported research.

Second litter progeny of male mice which had received gamma, neutron, and combinations of gamma and neutron irradiation at two dose levels had mean body weights which were not significantly different from control mice whose paternal ancestors had received no irradiation. Although some differences were observed in the intraperitoneal LD_{50} of pentobarbital sodium in the treated groups from one generation to another, there appeared to be no clear cut trends, no radiation-dose dependent changes in LD_{50}, and no observed cumulative effects induced by these doses and types of irradiation.

A66-81956
EFFECT OF GROUP VARIABILITY OF POOLED GROUP DECISIONS.
Howard E. Sattler (Ariz. State U., Tempe).
Psychological Reports, vol. 18, Jun. 1966, p. 676–678.

A probability dispersion model for assessing the effect of variability of knowledge within a group on accuracy of a pooled group decision demonstrates that: (a) the more heterogeneous the group, the more accurate the pooling result for groups whose members possess a knowledge level greater than .50, (b) the variability of the group makes no difference in the pooling result for groups whose members possess a knowledge level of exactly .50, and (c) the more homogeneous the group, the more accurate the pooling result for groups whose members possess a knowledge level lower than .50.

A66-81957

RELATION OF STIMULUS-SEEKING BEHAVIOR AND AROUSAL LEVEL.

Fredric M. Levine (Northwestern U., Evanston and Chicago, Ill.)

Psychological Reports, vol. 18, Jun. 1966, p. 743–746. 10 refs.

In order to test whether stimulation-seeking behavior is related to arousal level, subjects divided on the basis of both a questionnaire measure, the Taylor Manifest Anxiety Scale (MAS), and an arousal-producing task into high- and low-arousal groups. The frequency with which they pressed a telegraph key to turn speech noise either on or off was the dependent variable. There were no differences between the high- and low-arousal groups in the number of times they turned noise either on or off. This result was interpreted as not supporting the idea that stimulation-seeking behavior is an attempt to maintain an optimal level of arousal.

A66-81958

A BIBLIOGRAPHY ON THE PSYCHOLOGICAL ASPECTS OF SMOKING: JANUARY 1940 THROUGH SEPTEMBER 1965.

Bernard J. Fine, Michael Marchesani, and Donald R. Sweeney (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.)

Psychological Reports, vol. 18, Jun. 1966, p. 783–787. 142 refs.

One hundred forty-two references to articles concerned with psychological and physiological aspects of smoking are listed alphabetically. Years covered are January 1940 to September 1965.

A66-81959

REINFORCEMENT-TEST SEQUENCES IN PAIRED-ASSOCIATE LEARNING.

Chizuko Izawa (Stanford U., Palo Alto, Calif.)

Psychological Reports, vol. 18, Jun. 1966, p. 879–919. 28 refs.

Contract Nonr-225 (73).

To obtain evidence as to whether either learning or forgetting occurs on unreinforced trials and to adduce principles of optimal programming of reinforced (R) and test (T) trials, two experiments were planned each having four conditions with different repetitive R-T sequences: RTRT..., RRTRRT..., RTTRTT..., and RRTTRRTT.... Fifty college students in each experiment learned five paired associates under each condition. Performance on successive Ts without intervening reinforcement suggested that neither learning nor forgetting occurred on Ts per se. However, the occurrence of Ts increased the effectiveness of subsequent Rs. A stimulus fluctuation model accounted for the major acquisition and retention phenomena, including the differential rates of learning under the different R-T sequences.

A66-81960

RELATIONSHIP BETWEEN AGE AND RECALL OF MEANINGFUL MATERIAL.

Harry F. Desroches, Bernard D. Kaiman, and H. Ted Ballard (Veterans Admin. Center, Mountain Home, Tenn.)

Psychological Reports, vol. 18, Jun. 1966, p. 920–922.

Older and younger subjects were equated on original learning by learning a list of words to a criterion of one perfect trial. The older and younger subjects were divided into four recall interval groups: 15 min., 1 hr., 1 day, and 1 wk. The recall interval reached significance, but neither age nor the interaction between age and recall reached an acceptable level of statistical significance.

A66-81961

S-O-R AND THE PSYCHOLOGY OF HUMAN LEARNING.

Clyde E. Noble (Ga. U., Athens).

Psychological Reports, vol. 18, Jun. 1966, p. 923–943. 55 refs.

Contract Nonr-3677(02) and Grant AFOSR-1099-66.

A frame of reference is presented for describing the empirical laws of human learning and performance in terms of stimulus (S), organismic (O), and response (R) variables. The relationship of experimentation to the discovery of laws and the construction of theories is outlined, and some problems connected with the objective specification of S, O, and R events are discussed. Learning as a systematic concept is treated at two definitional (formal vs. operational) and two theoretical (Hull vs. Estes) levels. An analysis of the hypothetical associative factor (Hull's H or Estes' χ) reveals that it is basically a mathematical transformation of selected independent variables. Finally, a set of criteria is proposed by which the utility of theories of learning and performance may be evaluated.

A66-81962

HUMAN MAZE LEARNING AS A FUNCTION OF STRESS AND PARTIAL REINFORCEMENT.

P. E. Freedman (U.S. Army Natick Labs., Pioneering Res. Div., Natick, Mass.)

Psychological Reports, vol. 18, Jun. 1966, p. 975–981. 10 refs.

Ninety-six subjects learned a 23-row button maze under one of three stress conditions and partial or continuous reinforcement. Stress conditions were error, error and speed instruction, or error and speed instruction plus irrelevant shock. Numbers of errors were an increasing function of stress, but rate (responses per second) suggested a nonmonotonic function. Reinforcement schedule was not an effective variable. Results are discussed with relation to competing response tendencies associated with motivation.

A66-81963

ATHLETIC PERFORMANCE AT HIGH ALTITUDE.

D. A. Williams.

Nature, vol. 211, Aug. 13, 1966, p. 753.

Running times by athletes at the 1955, Mexico City, Pan-American Games, were compared with their best sea-level times for the years 1954 and 1955. The altitude at Mexico City is 7,500 ft. The increase in the times for the distance events are less than those calculated previously and range from 1.9% for the 800 m. to 6.8% for the 10,000 m. The 400 m. runners at Mexico City seem to have been assisted by the low aerodynamic drag at the high altitude; their times were reduced by an average of 1.1%. An equation was derived which indicates that the increase in time taken to run an event approaches the value of 7.1% for the very long races. This is in excellent agreement with another investigator's estimate of 8% based on maximum exercise tests as some assistance is probably gained from the lower aerodynamic drag on an athlete at an altitude of 7,500 ft.

A66-81964

EFFECTS OF COLD STRESS ON SERUM PROTEIN FRACTIONS OF THE PRAIRIE MEADOW MOUSE.

J. R. Bopp and W. S. Platner (Mo. U., School of Med., Dept. of Physiol., Columbia).

Nature, vol. 211, Aug. 6, 1966, p. 634.

This study was undertaken to test the effects of cold stress on the distribution of serum protein fractions of a wild species

of rodent, the prairie meadow mouse (*Microtus ochrogaster*), and compare its response with that of the rat. Twenty-four virgin females of the same age were divided into two equal groups. The control group was held at 22°C. room temperature, while the experimental group was placed in a cold room with a temperature of about 5°C. Both rooms were on a timed 12-hr. light cycle. Each mouse was individually caged with water and food *ad libitum*. Weight gain was not significantly different between the two groups, nor was the total serum protein changed by the cold exposure. The constituent serum proteins, however, displayed a significant change by a rise in serum albumin and a drop in the serum gamma globulin fraction in the cold-exposed group. Such a rise in the albumin fraction of the prairie meadow mouse is not consistent with the findings reported for the laboratory rat. Apparently this species of mouse is able to meet its energy needs without resorting to catabolism of albumin.

A66-81965
RESPONSE OF ALPHA MOTONEURONES TO DIRECT ELECTRICAL STIMULATION DURING DESYNCHRONIZED SLEEP.
A. R. Morrison and O. Pompeiano (Pisa U., Ist. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).
Nature, vol. 211, Aug. 6, 1966, p. 636–637. 5 refs.
PHS supported research.

Direct electrical stimulation of the motorneuronal pool was recorded from the tibial or the deep peroneal nerve in the deafferented hindleg of the cat. Single shocks were applied unipolarly to the ventral horns through a stainless steel microelectrode. This electrode, as well as the electrodes for the electroencephalographic recordings, the electromyographic recordings of the posterior cervical muscles, and for recording the ocular movements, were implanted chronically under Nembutal anesthesia. The size of the nerve action potential was taken as a measure of the number of alpha-motorneurons excited by the stimulus. The orthodromic response of the motor fibers to direct stimulation of the motorneuronal pool elicited in either the tibial or the deep peroneal nerve was not modified during transition from relaxed wakefulness to synchronized sleep. Furthermore, during synchronized sleep no significant difference was observed between spindle periods and interspindle lulls. The response of the alpha-motoneurons to direct stimulation was, however, tonically depressed during desynchronized sleep. It is concluded that an increase in the polarization of the motoneuronal membrane occurs during desynchronized sleep.

A66-81966
ON THE ABUNDANCE OF EARTH-LIKE PLANETS.
F. J. Donahoe (Wilkes Coll., Wilkes-Barre, Pa.)
Icarus, vol. 5, May 1966, p. 303–304. 5 refs

Earth-like planets may be more of a rarity than they were thought to be. The only other planet of the solar system which is large enought to retain for eons gases other than hydrogen and helium is Venus. It is hypothesized that the Earth's early encounter with the Moon dispersed the gases of the proto-Earth's atmosphere. Planets of approximately Earth mass should be Venus-like rather than Earth-like unless they form part of a double planet.

A66-81967
THE EFFECT OF ETHYL ALCOHOL ON ELECTROENCEPHALOGRAPHIC SLEEP CYCLES IN CATS.
Richard B. Yules, John A. Ogden, Frederick P. Gault, and Daniel X. Freedman (Yale U., School of Med., New Haven, Conn.)
Psychonomic Science, vol. 5, May 25, 1966, p. 97–98. 6 refs.
Grants PHS MH 0705, K3-18566, and M1463.

Electroencephalograms taken from four sleeping cats for three control and four alcohol consecutive nights show that if 1 g. ethanol/kg. body weight is administered 15 min. prior to sleep, Stage 1 rapid eye movement (REM) time decreases from control values the first two alcohol nights but returns to control levels on the third and fourth alcohol nights. This pattern of change in REM time is the same as that found in humans. The REM time pattern is effected by a change in length rather than in numbers of REM periods. These data support the use of cats in establishing a mechanism for REM sleep which can be extrapolated to humans.

A66-81968
RELATIONSHIPS OF STRESS, TRANQUILIZERS, AND SERUM CHOLESTEROL LEVELS IN A SAMPLE POPULATION UNDER STUDY FOR CORONARY HEART DISEASE.
John M. Chapman, Leo G. Reeder, Frank J. Massey, Jr., E. Raymond Borun, Bruce Picken, George G. Browning, Anne H. Coulson, and Don H. Zimmerman (Calif. U., School of Med. and School of Public Health, Los Angeles).
American Journal of Epidemiology, vol. 83, May 1966, p 537–547. 31 refs.
Grant PHS H-4087 and UCLA supported research.

An association of serum cholesterol levels with the use of tranquilizing drugs was observed in a sample population under study for coronary heart disease. For the 68 men taking tranquilizers, the mean cholesterol was 274 milligrams percent; the 1,073 men not taking tranquilizers, the mean was 251 milligrams percent. While the use of tranquilizers was associated with certain measures of stress, the high cholesterol levels among men taking these drugs occurred independently of the stress indicators used in this study. The high cholesterol levels in men on tranquilizers could not be accounted for by the individual factors studied, including body weight, blood pressure, physical activity, smoking habits, and underlying diseases and conditions.

A66-81969
EFFECTS OF HYPOXIA ON THE MONOSYNAPTIC REFLEX PATHWAY IN THE CAT SPINAL CORD.
Rosamond M. Eccles, Y. Loyning, and T. Oshima (Australian Natl. U., Dept. of Physiol., Canberra).
Journal of Neurophysiology, vol. 29, Mar. 1966, p. 315–332. 38 refs.

The effects of hypoxia on spinal elements involved in the monosynaptic reflex in cats were studied. Hypoxia was induced by ventilating the cats with gas containing 0–5% oxygen in nitrogen. The spinal monosynaptic reflex and the motoneurons were rather insensitive to hypoxia. Usually, reoxygenation brought about complete recovery. No significant change was observed in the excitability and electrical resistance of the motoneuron membrane. It is suggested that the changes were due to a depression of the ionic pump rather than to conductance changes in the membrane. The changes observed in the excitability of the presynaptic elements and in the focal potential were interpreted as due to a gradual depolarization of the afferent nerve branches and terminals, eventually resulting in conduction block. The monosynaptic excitatory postsynaptic potential was regularly increased initially; later it decreased gradually and disappeared. It is suggested that the initial increase is due to an increased release of transmitter substance

and that the later decrease is due to conduction block presynaptically. It is further suggested that the presynaptic nerve terminals are the most sensitive spinal element in the monosynaptic reflex arc and that the presynaptic effects of hypoxia are responsible for the reflex changes by initially increasing and later decreasing the excitatory post synaptic potential of cells firing.

A66-81970
EFFECTS OF ALCOHOL AS MODIFIED BY TRANQUILIZING DRUGS.
Marianne Frankenhaeuser, Jan. Fröberg, Leonard Goldberg, and Anna-Lisa Myrsten.
Reports from the Psychological Laboratories, University of Stockholm, no. 199, Nov. 1965, p. 1–9. 17 refs.
Swed. Med. Res. Council, Swed. Council for Social Sci. Res. and Stockholm U. supported research.

Effects of 0.55 g. alcohol per kg. body weight when given together with either a placebo, 800 mg. meprobamate, or 20 mg. chlordiazepoxide, were examined in eight normal subjects. Mean time-response curves for each experimental condition in simple and choice reaction time, Spokes A and B tests, and subjective reactions were assessed. After meprobamate, performance was more impaired and subjective intoxication was more pronounced than in the alcohol+placebo condition. After chlorodiazepoxide, performance was, on the whole, less impaired than after alcohol+meprobamate, and the subjective reactions were less pronounced than in both other alcohol conditions.

A66-81971
STUDY OF PULMONARY VOLUMES AND VENTILATION [K VOPROSU OB ISSLEDOVANII LEGOCHNYKH OB"EMOV I LEGOCHNOI VENTILIATSII].
A. G. Dembo, V. IA. Pozin, IU. M. Shapkaits.
Terapevticheskii Arkhiv, vol. 37, Dec. 1965, p. 19–26. 19 refs. In Russian.

The study of pulmonary volumes, in particular the total lung volume, is important in the investigation of respiration. Gas analysis and oximetry of residual air were of identical value in individuals with healthy circulatory and respiratory systems. The composition of the total lung volume of healthy individuals changed with different functional states of the body. Marked changes in residual air and total lung volume were noted in individuals with circulatory and respiratory disturbances. Electromyography of the respiratory muscles along with a number of functional respiratory tests described to a certain extent the work performed by respiration. Energy expenditure per liter of ventilated air decreased as the functional state of the body improved.

A66-81972
GAS CHROMATOGRAPHIC DETERMINATION OF CARBON-TETRACHLORIDE[SIC] IN A CASE OF ACCIDENTAL POISONING.
Joseph Fischl and Moshe Labi (Asaf Harofe Govt. Hosp., Depts. of Biochem. and Internal Med., Zerifin, Israel).
Israel Journal of Medical Science, vol. 2, Jan.–Feb. 1966, p. 84–85. 6 refs.

The extensive use of carbon tetrachloride as an industrial solvent requires a rapid test for its detection in physiological fluids in cases of possible accidental poisoning. The author describes a gas chromatography method which permits detection of 500 p.p.m. carbon tetrachloride in blood serum and urine. Preliminary conclusion, based on one case, was that 1,000 p.p.m. in body fluids could indicate a mild poisoning.

A66-81973
EVALUATION OF MENTAL STRESS DURING WORK [K PROBLEMU POSUZOVANI PSYCHICKE ZATEZE PRI PRACI].
O. Matousek and J. Stikar.
Ceskoslovenska Psychologie, vol. 10, no. 3, 1966, p. 256–267. 42 refs. In Czech.

From the point of view of working activity, stress means disproportion between the requirements and the average capacity for task solution. The human organism is capable of mobilizing sources of reserve in exacting conditions, of maintaining for a certain period equivalence between the internal state and external conditions, and of passing beyond the borderline of the "average capacity". This dynamic process, the basis of which is homeostasis, may be called adjustment. The adjustment syndrome is under these conditions an indirect indicator of psychic stress. There is no method which could be reliably applied as a matter of routine for the evaluation of psychic stress in working activity. The survey of the methods used so far have a rather laboratory-model character, and are predominantly indirect methods. Further research of psychic stress problems and the possibilities of stress evaluation and comparison must be preceded by successful attack on three complexes of problems: research into informational capacity of man, his limits of adjustment, and research of fatigue from the point of view of subjective expression and functional changes in the organism.

A66-81974
CURRENT STATUS OF RESEARCH AND THEORY IN HUMAN PROBLEM SOLVING.
Gary A. Davis (Wis. U., Res. and Develop. Center for Learning and Re-educ., Madison).
Psychological Bulletin, vol. 66, Jul. 1966, p. 36–54. 129 refs.
Grant NIH MH-21,375 and Contract OE 5-10-154.

Problem solving theories in three areas are summarized: traditional learning and cognitive-Gestalt approaches plus more recent computer and mathematical models of problem solving. Recent empirical studies are categorized according to the type of behavior elicited by the particular problem-solving task. Anagram, "insight," water-jar, and arithmetic problems are considered to be solved by covert trial-and-error behavior (Type C problem-solving tasks). Switch-light, classification, probability-learning, and numerous "miscellaneous" tasks are approached by overt trial-and-error behavior (Type O problem-solving tasks).

A66-81975
SIGNAL-DETECTION METHODS IN PERSONALITY AND PERCEPTION.
Richard H. Price (Ill. U., Urbana).
Psychological Bulletin, vol. 66, Jul. 1966, p. 55–62. 35 refs.

Methodological problems encountered in the use of traditional threshold measures in the study of personality and perception are discussed. The threshold is shown (a) to yield results dependent upon the psychophysical method used, (b) to be arbitrary in definition, (c) to be unimproved by corrections for guessing, and (d) to confound the observer's sensory capabilities with his criterion for reporting a given stimulus event. Methods derived from signal-detection theory are described. Studies using the logic and methods of signal-detection analysis is personality and perception research are reviewed and their implications discussed.

A66-81976
CEREBRAL SOMATOSENSORY RESPONSES EVOKED DURING SLEEP IN MAN.

W. R. Goff, T. Allison, A. Shapiro, and B. S. Rosner (Veterans Admin. Hosp., West Haven, Conn., Yale U. School of Med., New Haven, Conn., and N. Y. State U. Downstate Med. Center, Brooklyn).
(Eastern Psychol. Assn., 1964).
Electroencephalography and Clinical Neurophysiology, vol. 21, Jul. 1966, p. 1–9. 36 refs.

Human somatic evoked responses (SERs) were recorded from the scalps of eleven subjects during percutaneous shock stimulation of median nerve during waking, slow wave, and rapid eye movement (REM) sleep. Both short- and long-latency SERs varied systematically with stage of sleep. (1) The cortical primary post-synaptic positivity was markedly reduced in REM sleep compared to waking and slow wave sleep. (2) Short-latency (15 msec.) "myogenic" evoked responses recorded percutaneously from trapezius muscle at the neck showed no change from waking to sleep. Thus they do not appear to be mediated in the same way as monosynaptic or polysynaptic spinal reflexes found by others to be suppressed during REM. (3) Long-latency SERs seen during waking were essentially absent in the drowsy subject and during REM. As the electroencephalogram (EEG) synchronized, late activity occurred consisting of two negative–positive sequences, 6a and 6b, respectively. Component 6a decreased in amplitude with increasing synchronization. Component 6b increased in amplitude with increasing synchronization. It is suggested that it has no waking counterpart but represents the release of neural activity inhibited in waking and REM. SER components 6a and 6b were also evoked by auditory stimulation. Component 6b corresponds to the K complex.

A66-81977
EVOKED POTENTIALS IN MAN: INTERACTION OF SOUND AND LIGHT.
L. Cigánek (Slovak Acad. of Sci., Inst. of Normal and Pathol. Physiol., Dept. of Electrophysiol. of the Nervous System, Bratislava, Czechoslovakia).
Electroencephalography and Clinical Neurophysiology, vol. 21, Jul. 1966, p. 28–33. 18 refs.

The interaction of sound and light stimuli was studied in man. Clicks followed by flashes at varying intervals were used and the electroencephalogram (EEG) responses evoked by these paired stimuli in the occipital region were recorded. In contradistinction to the previously investigated paired light stimuli no refractory, supernormal (facilitation) or subnormal period was found for the first six waves (I-VI) of the second visual response. A simple superposition of the two responses was present. The origin of both responses in a common cerebral macro-structure, within the occipital region but with separate "private" projection pathways and cortical elements, is assumed. The last wave (VII) of the visual response presents a significantly smaller amplitude with click preceding the flash by 250 msec. Since the same can be seen with paired light stimuli, the origin of the waves VII evoked by click and by flash in identical cerebral structures is suggested.

A66-81978
ELECTROMYOGRAPHIC INVESTIGATION IN LEAD POISONING [L'INDAGINE ELETTROMIOGRAFICA NELL'-INTOSSICAZIONE PROFESSIONALE DA PIOMBO].
B. Dellepiane, B. Bogetti, and G. Cabella (Genova U., Ist. di Med. del Lavoro, Italy).
Lavoro e Medicina, vol. 20, Jan.–Feb. 1966, p. 11–30. 35 refs. In Italian.

Results are reported of an electromyographic investigation carried out on 42 patients suffering from professional lead poisoning. Most patients (57%) showed electromyographic alterations while no pathologic signs could be seen at the neurological examination of 35.7% of the patients. Electroencephalographic tests were negative in all subjects. The electromyographic alterations which were seen show that both the central and the peripheral systems are very often involved at the same time. Electromyograms as well as neurologic clinical pictures tend to show, in saturnism, that all sections of the central nervous system are involved.

A66-81979
CONTINUOUS MEASUREMENT OF VENTRICULAR STROKE VOLUME BY ELECTRICAL IMPEDANCE.
L. A. Geddes, H. E. Hoff, A. Mello, and C. Palmer (Baylor U., Coll. of Med., Dept. of Physiol., Houston, Tex.)
Cardiovascular Research Center Bulletin, vol. 4, Apr.–Jun. 1966, p. 118–131. 41 refs.

The continuous measurement of stroke volume was carried out in dogs employing the left ventricle as a conductivity chamber. A relationship between the impedance change and volume ejected was determined on excised hearts using blood and saline and on hearts in vivo which were temporarily arrested by vagal stimulation. The calibration factors obtained on the excised hearts were different from those found in vivo. In the latter series, an impedance change of 6.62 ohms/cc. was found for 15-kg. dogs. The impedance-time and volume-time curves were almost superimposable, indicating that the impedance change truly reflects the manner in which volume is delivered from the left ventricle. Within the range of frequency, extending from 20 kc. to 200 kc., the volume-impedance change was essentially the same for excised hearts. Because the impedance measured between the electrodes is almost totally dependent on the amount of blood between them, the impedance method without calibration offers a means of continuously measuring changes in stroke volume and cardiac output in the experimental animal. Because the method employs no transducer, there is virtually no response-time error, thus the impedance change indicates a volume change as it occurs. The method was used to study the dynamic emptying of the ventricles during and after atrial fibrillation.

A66-81980
NOTE ON THE SYSTEMATIC ERROR OF ESTIMATION AS A FUNCTION OF STIMULUS MAGNITUDE.
Veijo Virsu (Helsinki U., Inst. of Psychol., Finland).
Scandinavian Journal of Psychology, vol. 7, no. 2, 1966, p. 76–80. 6 refs.

On the basis of a discussion of Weber's law the prediction was made that the systematic errors of estimation are linear functions of stimulus magnitude. As a special case it is suggested that the size of a geometrical illusion generally is a linear function of the size of the illusion figure. The result of an experiment with Oppel's illusion is in agreement with this prediction. During successive estimations practice did not decrease the amount of illusion.

A66-81981
VALUE AND SIZE PERCEPTION.
Per Saugstad and Per Schioldborg (Oslo U., Inst. of Psychol., Norway).
Scandinavian Journal of Psychology, vol. 7, no. 2, 1966, p. 102–114. 34 refs.

A detailed review is presented of studies related to the accentuation hypothesis of Bruner and Goodman (1947). It is found that the results from (1) coin studies, (2) symbol

studies, and (3) other studies are conflicting and do not substantiate the hypothesis. Through an analysis of this hypothesis and a specification of the concept of perception, the various designs are found to be inadequate for demonstrating perceptual accentuation of size. The hypothesis is forwarded that value asserts an influence upon imaginary processes related to the experience of size.

A66-81982
THE INFLUENCE OF WATER RESTRICTION ON THE PERFORMANCE OF MEN DURING A PROLONGED MARCH.
N. B. Strydom, C. H. Wyndham, C. H. van Graan, L. D. Holdsworth, and J. F. Morrison (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
South African Medical Journal, vol. 40, Jun. 25, 1966, p. 539–544. 16 refs.

Two groups of 30 men each were made to carry out a march of 18 miles in full army kit. The members of one group were supplied with water ad libitum and those of the other group were rationed to one liter of water during the march. Temperature conditions during the study were mild. Dry-bulb temperatures did not exceed 31.1°C. (88°F.); the wet-bulb temperature was about 19°C. (66°F.) and Globe Temperature readings varied from 37.8° to 49° C. (100°–120° F.) depending upon the degree of cloud cover. Twelve of the 30 men given water ad lib failed to complete the march. Of those who fell out, seven of the men on one liter of water collapsed while only one of the men given water ad lib collapsed. Bootrub accounted for 16% of the total casualties in both groups. The final average rectal temperature of the water-restricted group was 38.8°C. (101.8°F.) compared with 38.3°C. (101°F.) for the ad lib-water group. Oral temperatures proved to be quite useless as a means of detecting rise in body temperatures; oral temperatures fell and rectal temperatures rose as the march progressed, and at the end of the march there was an average difference of 2.2°C. (4°F.) between oral and rectal temperatures. The average water losses in sweat were 4.5 liters in both groups of men. Taking into account water requirements for body function for the rest of the 24 hours, an amount of at least seven liters (12 pints) per man per day is required for men engaged in similar activities in the summer of temperature regions. The group of men provided with only one liter of water exhibited dehydration to an extent of 5%, at which level they showed low morale and lack of motivation, became quarrelsome and difficult to control and refused to continue the march.

A66-81983
PSYCHIATRIC AND EEG OBSERVATIONS ON A CASE OF PROLONGED (264 HOURS) WAKEFULNESS.
George Gulevich, William Dement (Stanford U., School of Med., Dept. of Psychiat., Palo Alto, Calif.), and Laverne Johnson (U.S. Naval Med. Neuropsychiat. Res. Unit, San Diego, Calif.)
Archives of General Psychiatry, vol. 15, Jul. 1966, p. 29–35. 30 refs.
Grants PHS MH 08185 and 1-K3-MH-5804; NSF and Navy Dept. supported research.

This study reports psychiatric and sleep electroencephalogram (EEG) observations after 264 hours of sleep deprivation in a normal, 17-year-old, white male. The subject developed some behavioral changes frequently reported as characteristic of sleep deprivation, but the so-called psychosis of sleep deprivation did not develop. Several possible reasons for the maintenance of ego functions despite the severe stress of prolonged wakefulness are discussed. Sleep EEG data from three recovery sleep nights and from three postrecovery nights are presented. There was a marked increase in rapid eye movement (REM) sleep during the recovery nights comparable to the increase seen in REM deprivation studies. The increase seen in Stage four sleep during the recovery nights was no greater than has been observed after 100 hours of wakefulness. These data do not support the idea that the deprivation of Stage four sleep is cumulative as is the deprivation of REM sleep. The data indicate that prolonged sleep deprivation does not necessarily result in psychosis. However, other behavioral changes noted during prolonged wakefulness may be specifically associated with either REM or NREM deprivation, and some possible mechanisms regarding this specificity are outlined.

A66-81984
MENTAL PERFORMANCE IN DRY HEAT [MENTAL PRESTATIONSFORMAGA I HOG VARME].
Gunilla Bliding, Bo Hagberg, Börje Löfstedt, and Lars Trygg (Lund U., Inst. för hyg. and Psykol. Inst., Sweden).
Nordisk Hygienisk Tidskrift, vol. 47, no. 1, 1966, p. 1–7. 15 refs. In Swedish.

Mental performance of a group of 21 unacclimatized healthy female subjects aged 19 to 24 years was studied in three different temperatures: 31°C.; 43°C.; and 53°C.; all with a humidity corresponding to 12 mm. Hg water vapor pressure and in relation to personality characteristics. A group of ten controls matched to the experimental group in terms of personality measures was studied under the same conditions but with three exposures to the 31°C. temperature condition. The mental performance was measured by a short time test, (color-word-test according to Smith and Nyman (1962), which was also used as a personality test) and a long-time test (addition and figure memory test). It was shown that the mental performance of subjects who maintain thermal equilibrium is not affected. Those who did not maintain thermal equilibrium showed a deterioration of performance where their personality was characterized by lacking control functions whereas the performance of those with more stable or rigorous controls was not affected.

A66-81985
CRITICAL BODY TEMPERATURES FOR LONG TIME HEAT EXPOSURE AND SEX DIFFERENCES IN HEAT TOLERANCE [KRITISKA KROPPSTEMPERATURER VID LANGVARIG VARMEEXPOSITION SAMT KONSDIFFERENSER I VARMETOLERANS].
Börje E. Löfstedt (Lund U., Från Inst. för hyg., Sweden).
Nordisk Hygienisk Tidskrift, vol. 47, no. 1, 1966, p. 8–18. 10 refs. In Swedish.

Male and female subjects were exposed for various periods to different heat levels (30.5–61.8°C). It was observed that at rectal temperatures above 37.9–38.6°C physiological equilibrium cannot be maintained, whereas it can below this limit; the latter should be useful as the upper limit for safe heat exposure. Women were considerably less tolerant than men.

A66-81986
NOISE ANNOYANCE AND PSYCHOLOGICAL DISPOSITION [OM BULLERBESVAR OCH PSYKISK LAGGNING].
Curt R. Johansson (Lund U., Depts. of Hyg. and Psychol., Sweden).
Nordisk Hygienisk Tidskrift, vol. 47, no. 1, 1966, p. 19–25. 27 refs. In Swedish.

The relationship between the physical properties of sound and the psychological experience of loudness was investigated.

Subjects were classified with respect to the following defense mechanisms: (1) isolation (I) usually indicating compulsive neurotic behavior or disposition; (2) repression (R) usually indicating hysterical neurotic behavior or disposition; (3) isolation and repression in combination (I+R); and (4) no manifest defense mechanism as revealed by the Defense Mechanism Test. A hypothesis was proposed concerning a similar reaction pattern in relation to environmental stimuli to the disturbed in the noisy area and the non-disturbed in the quiet area. The Defense Mechanism Test supported this hypothesis insofar as individuals with expected reaction had the same psychological dispositions (N or I) and thus differed from individuals with unexpected reactions who seemed to have a tendency to poorer adaptation to reality according to the test results (R or I+R).

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A66-81987
DEPOSITION OF INHALED MERCURY IN LUNG AND BRAIN OF GUINEA-PIG. [LUNG- OCH HJARNDEPOSITIONEN AV INHALERAT KVICKSILVER—PRELIMINART MEDDELANDE FRAN EN UNDERSOKNING PA MARSVIN].
Gunnar Nordberg and Fredrik Serenius (Statens Inst för folkhälsan, Karolinska Inst. och allmänhyg. avdelningen, Från hyg. inst., Stockholm, Sweden).
Nordisk Hygienisk Tidskrift, vol. 47, no. 1, 1966, p. 26–27. In Swedish.

At different intervals after exposure to radioactive mercury vapor, the distribution of the metal in lung and brain was illustrated by autoradiography. Mercury was found to be deposited in the bronchial tree of the lung as well as in the alveoli. Shortly after exposure the mercury in the brain accumulated in cortex cerebri et cerebelli. Six to sixteen days after exposure, however, the concentration of mercury in the cerebrum was found to be lower in the cortex than in the white matter of the corpus callosum. At these longer post-exposure intervals some parts of the brain stem revealed higher levels of concentration as compared to other parts of the brain.

A66-81988
CLIMATIC INFLUENCE ON SMELL AND IRRITATION EFFECTS FROM TOBACCO SMOKE [KLIMATINVERKAN PA LUKT OCH IRRITATIONSEFFEKT AV TOBAKSROK PRELIMINART MEDDELANDE].
Curt R. Johansson and Hans Ronge (Lund U., Dept. of Hyg., Sweden).
Nordisk Hygienisk Tidskrift, vol. 47, no. 1, 1966, p. 33–39. In Swedish.

The effects of temperature and humidity upon smell and irritation from tobacco smoke were studied in a climatic chamber using 6 smokers and 6 non-smokers. The subjects entered the chamber 5 minutes prior to the smoking period, facilitating the determination of whether irritation was due to climate or smoke. In non-smokers, it was found that nose irritation rose rapidly during the first 10 minutes, while eye irritation rose continuously with smoke concentration. At 25 to 26°C., the irritation intensity became significantly less with increased humidity. At 18 to 19°C., the irritation was highest at 50% relative humidity. No great difference between smokers and non-smokers was found in eye irritation. However, non-smokers were more sensitive to nose irritation than smokers.

A66-81989
INFRARED RADIANT ENERGY AND OSCILLATIONS OF THE CORNEORETINAL POTENTIAL IN MAN.
Stephen G. Anderson and Hansjoerg Kolder (Emory U., Div. of Basic Health Sci., Dept. of Physiol., Atlanta, Ga.)
Investigative Ophthalmology, vol. 5, Jun. 1966, p. 242–247. 33 refs.
Grant NIH NB-02530.

The corneoretinal potential is indirectly and intermittently measured. Attempts are made to evoke oscillations in the corneoretinal potential with infrared radiant energy, polychromatic light including infrared radiant energy, and with polychromatic light essentially free from infrared radiant energy. It is concluded that infrared radiant energy, as used in this study does not contribute significantly as stimulus to evoke oscillations in the corneoretinal potential of man, when used either as sole source of radiant energy or together with polychromatic light. Radiant energy in form of visible light is the predominant factor in evoking both the slow and the fast oscillation. Changes in skin resistance or skin potential are not likely to contribute to oscillations observed in the corneoretinal potential when recorded by the indirect method.

A66-81990
A MULTIVARIATE APPROACH TO THE ANALYSIS OF AVERAGE EVOKED POTENTIALS.
Emanuel Donchin (Calif. U., Dept. of Psychol., Los Angeles).
IEEE Transactions on Bio-Medical Engineering, vol. BME-13, Jul. 1966, p. 131–139. 31 refs.
NASA Grant NsG-215-62 and Contract NsG-623 and Grant NSF GB-1844.

An approach to the quantitative analysis of average evoked potential data is presented. An average evoked potential is assumed to be a sample from a multivariate normal distribution. Using this assumption, multivariate statistical techniques can be applied to test hypotheses about the similarity or difference of evoked potentials obtained under different conditions. To facilitate the analysis and to provide an objective definition of the components of the evoked potentials, a principal component analysis can be applied to the data matrix transforming each evoked potential into a vector or uncorrelated component scores. The region in time over which each component acts can be determined from the correlations between the components identified and the time-coordinates. The application of these techniques is illustrated for studies of the effect of stimulus intensity and stimulus duration on the evoked potential.

A66-81991
A TELEMETERING SYSTEM FOR SECURING DATA ON THE MOTILITY OF INTERNAL ORGANS.
E. M. Lonsdale, J. W. Steadman, and W. L. Pancoe (Wyo. U., Dept. of Elec. Eng., Laramie).
IEEE Transactions on Bio-Medical Engineering, vol. BME-13, Jul. 1966, p. 153–159. 8 refs.

A telemetering system using an elongation sensor in conjunction with an implantable transmitter is described. The transmitter can be turned on and turned off by use of a pulsed radio-frequency source and has a useful life in excess of two months. The sensor is a newly developed device capable of giving a usable signal when elongated by as little as 0.05 mm. It is fabricated from commonly available material and can be constructed by any reasonable skilled technician. Stomach activity recordings for a rat under various physiological conditions are presented as well as recordings taken when the animal was subjected to a drug and to a sudden fright. Problems are encountered in stabilizing zero-set drifts, and difficulties are anticipated in deterioration of the transducer action over a period of several months due to seepage of body fluids through the protective coating.

A66-81992
NEURAL MODELING.
L. D. Harmon and E. R. Lewis (Bell Telephone Labs., Inc., Murray Hill, N. J. and Gen. Precision, Inc., Librascope Group, Glendale, Calif.)
Physiological Reviews, vol. 46, Jul. 1966, p. 513–591. 305 refs.
Contracts AF 49(638)-1232 and AF 33(615)-2464.

Overt neural modeling has proven valuable in neurophysiology, and it seems certain that it will continue to do so. The purposes of modeling that are significant to physiologists are threefold: facilitation of preliminary testing of pertinent hypotheses, provision of tractable means of synthesizing disparate physiological data into unified consistent pictures, and generation of guidelines to crucial physiological experiments. In this review we have shown how numerous models have fulfilled one or more of these goals, contributing concrete knowledge to neurophysiology. Contemporary neural models are playing an important role in complementing direct neurophysiological investigation. While their accomplishments have been substantial, their utility certainly has by no means been fully exploited. The increasingly close liaison between theoretical and experimental neurophysiology made possible by modeling presents an intriguing challenge for the future.

A66-81993
EXPERIMENTAL SHOCK IN ANIMALS ADAPTED TO HIGH ALTITUDES.
V. Zapata-Ortiz, R. Castro de la Mata, E. Fernández, A. Geu, and L. Batalla (U. Peruana "Cayetano Heredia", Fac. de Med., Dept. of Pharmacol., Lima, Peru).
Acta Physiologica Latino Americana, vol. 16, no. 1, 1966, p. 66–67.
Grant NIH HE 08732-02.

Experiments investigating possible differences in resistance to trauma (shock by tourniquet and by burns) between guinea pigs and rats born and raised at high altitudes and those born and raised at sea level are presented. Animals that did not die within 24 hours following shock exposures were considered survivors. There was a highly significant difference between the two groups. Observations of the high altitude animals was prolonged for 4 days, and no variation in mortality was noted although some of them had great zones of infected sores with complete destruction of the skin on their hind legs.

A66-81994
EXPERIMENTAL STUDIES ON CHEMICAL PROTECTION AGAINST IONIZING RADIATION [BADANIA DOSWIADCZALNE NAD OCHRONA CHEMICZNA PRZED PROMIENIOWANIEM RENTGENOWSKIM].
Tadeusz Zebro.
Folia Medica Cracoviensia, vol. 8, no. 1, 1966, p. 149–187. 90 refs. In Polish.

Postradiation damage of the intestinal mucose and kidneys was studied histologically in mice subjected to irradiation with 500 r of X-rays, with and without prior administration of cysteinethiosulfonate (CTS). Samples of the organs secured from animals killed 1–20 days after irradiation allowed study of the course of development of the lesions. Lesions were observed in the alimentary tract, one to five days after irradiation. On the eighth day after irradiation the lesions in the intestines were not pronounced. Marked intestinal lesions were observed 15 and 20 days after irradiation, consisting of degeneration and disseminated necrosis of glandular epithelium. The observations indicate that after initial temporary regression on the eighth day, two weeks after irradiation an exacerbation of the postradiation changes occurs. These lesions may involve bacteremia, and may be responsible for increased mortality of the animals at this time. In the group of animals treated with CTS before irradiation, the lesions were less extensive and less pronounced. In the kidneys, degenerative and necrotic lesions were observed between the third and eighth days after irradiation in the epithelium of the renal tubules in irradiated mice only in the group not protected by administration of CTS. The observations indicate that CTS protects the intestinal mucosa and kidneys against radiation damage.

A66-81995
DYNAMIC ELECTROCARDIOGRAPHY AT HIGH ALTITUDE.
J. S. Sanders and J. M. Martt (Mo. U., School of Med., Columbia).
Archives of Internal Medicine, vol. 118, Aug. 1966, p. 132–138. 20 refs.
Grant UHF 5595-2601 and OE Work Study supported research.

A study of dynamic electrocardiography during various physical activities at high altitudes (7,500–14,255 feet) revealed several findings of interest, including Q-T-interval prolongation, marked rate acceleration during strenuous exertion, and some change in QRS configuration. Despite the rapid rate and maximum stress, no definite ischemic changes were recorded.

A66-81996
AFFERENT AND EFFERENT ACTIVITY IN SINGLE UNITS OF THE CAT'S OPTIC NERVE.
D. N. Spinelli and Morey Weingarten (Stanford U., Palo Alto, Calif.)
Experimental Neurology, vol. 15, Jul. 1966, p. 347–362. 36 refs.
Contract DA-49-193-MD2328 and Grant PHS MH 03732.

Auditory and somatic stimuli were shown in a previous study to elicit efferent activity in the optic nerve of cats; this activity was recorded with gross electrodes. This study was undertaken with the purpose of identifying efferent activity at the single unit level. Afferent units and the changes induced in their activity by auditory and somatic stimulation were also analyzed. Twenty healthy, adult cats were used; records were taken from 300 units. Twenty-nine of these units were found to be selectively activated by the nonvisual stimuli and classified as efferent. Among the efferent fibers, 48 were modified in their activity by auditory and somatic stimulation. Two types of efferent units with characteristics not previously reported for the cat's retina were identified during the course of this work. These were units responsive to the light flux, and units responsive to the direction of movement of a spot of light.

A66-81997
RETINAL RECEPTIVE FIELD CHANGES PRODUCED BY AUDITORY AND SOMATIC STIMULATION.
Morey Weingarten and D. N. Spinelli (Stanford U., Palo Alto, Calif.)
Experimental Neurology, vol. 15, Jul. 1966, p. 363–376. 14 refs.
Contract DA-49-193-MD2328 and Grant PHS MH 03732.

The existence of efferent influences on the cat retinal ganglion cell was shown in previous studies. These experiments, utilizing both chronic macroelectrode and acute microelectrode techniques, demonstrated responses in the optic nerve to auditory and somatic stimuli. Afferent activity in the

optic nerve was also modified by these stimuli. The present experiments were undertaken as an extension of this effort. Retinal receptive fields were mapped in immobilized cats. The value of the mapping technique used for these experiments is that it provides an accurate definition of receptive field boundaries. Auditory or somatic stimuli induced reliable dimensional changes in 76% of the receptive fields examined. Changes in the firing strength of units were also produced by the nonvisual stimuli. These changes were not directly correlated with the dimensional changes observed. No lawful relationship was found between direction of change and the type of efferent stimulation or type of receptive field or both. Changes in receptive field dimension were also elicited by a change in ambient illumination. An interaction between the changes caused by nonvisual sensory stimulation and those brought about by a change in ambient illumination was found in two instances.

A66-81998
THE INTERNAL CLOCK HYPOTHESIS FOR ASTRO-NAVIGATION IN HOMING PIGEONS.
Merle E. Meyer (Western Wash. State Coll., Pullman).
Psychonomic Science, vol. 5, Jul. 5, 1966, p. 259–260. 5 refs.
Soc. of The Sigma Xi and RESA Res. Fund. supported research.

One of the major assumptions of Matthews' sun-arc hypothesis (1955) is that of the internal clock which, together with changes in the arc angle of the sun, is used to estimate longitude. This study investigated birds' ability to make time judgments and concluded that homing pigeons are able to detect time intervals sufficiently well to navigate. The data would not support pinpoint navigation but are compatible with the theory.

A66-81999
SENSITIVITY OF THE PIGEON TO CHANGES IN THE MAGNETIC FIELD.
Merle E. Meyer (Western Wash. State Coll., Pullman) and Dean R. Lambe (Duke U., Durham, N. C.)
Psychonomic Science, vol. 5, Jul. 5, 1966, p. 349–350. 7 refs.
Grant PHS MH 10868-01.

Talkington (1964) suggested that birds use changes in the magnetic field to navigate. He hypothesized that when the bird flies through the magnetic field, signals arise from the pectens of the bird's eyes and the bird navigates on the basis of these stimuli. This study investigated the pigeon's such discriminations and concluded that the pigeon does not have the sensitivity for such discriminations.

A66-82000
EFFECTS OF ENVIRONMENT ON RESPIRATORY FUNCTION: WEEKLY STUDIES ON YOUNG MALE ADULTS.
Michael J. Spodnik, Jr., Georgia D. Cushman, David H. Kerr, Richard W. Blide, and William S. Spicer (Md. U., School of Med., Div. for Pulmonary Diseases, Baltimore).
Archives of Environmental Health, vol. 13, Aug. 1966, p. 243–254. 13 refs.
Grant PHS AP00045.

One hundred young white male college students were divided at random into seven groups for evaluation of respiratory function using the whole-body pressure plethysmograph. A different group was studied on each Thursday afternoon, in rotation, during the period of October 22 through May 27. Variation in group mean respiratory function occurred which resembled a single cycle with poorest function in February–March. The subjects within groups underwent parallel changes in function. After correction of intergroup differences, these respiratory function changes correlated significantly and best with temperature outside on the day of measurement. Airway resistance increased as temperature decreased. Subjects with a history of asthma, but presently asymptomatic, had significantly abnormal respiratory function in comparison to their normal classmates and responded differently to temperature change.

A66-82001
MODULATION DURING SLEEP OF THE SPINO-CEREBELLAR EVOKED POTENTIALS.
G. Carli, K. Diete-Spiff, and O. Pompeiano (C.N.R., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, U., Ist. di Fisiol, Italy).
Experientia, vol. 22, Jul. 15, 1966, p. 455.
Grant NIH NB-02990-05.

The modulation during physiological sleep of the cerebellar evoked potentials elicited by single shock stimulation of hindlimb nerves was investigated in 12 unrestrained, unanesthetized cats. The electroencephalogram (EEG), the electromyogram of the posterior cervical muscles (EMG), and the electro-oculogram (EOG) were recorded through chronically implanted electrodes. During the desynchronized phase of sleep, there was a striking depression of the cerebellar evoked potentials. The depression, similar to that which involves the orthodromic lemniscal response on stimulation of peripheral nerves, is related to the mechanisms which are also responsible for the ocular movements. The modulation of the cerebellar evoked potentials during desynchronized sleep is probably due to a phasic inhibitory control of transmission of group II and III afferent volleys through the channels which transmit the spinal information from the hindlimb to the cerebellum.

A66-82002
SLEEP, DREAMS, AND AROUSAL.
Edward J. Murray (Syracuse U., N. Y.)
New York, Appleton-Century-Crofts, 1965, xxiv+407 p. Many refs. $7.00.

The sleep motive appears to be comparable to other homeostatic motives. It is hypothesized that sleep permits the conservation of energy; the diversion of energy for growth, repair, and resistance; and the restoration of energy reserves before their actual depletion. Several functions of dreams have been suggested: the protection of sleep, the discharge of daily tensions, and the maintenance of primitive vigilance. Regardless of the exact function of dreaming, it is characterized by cortical and autonomic arousal, loss of muscle tonus and possibly heightened thresholds, rapid eye movements, and primitive thought processes. A review of the physiological and psychological mechanisms and implications of arousal, sleep, and dreams are presented.

A66-82003
IMPORTANT MEDICAL FACTORS IN FLIGHT SAFETY.
Ishrat Husain.
Pakistan Armed Forces Medical Journal, vol. 16, Jan. 1966, p. 20–25. 12 refs.

The human factor causes of aviation accidents enumerated include poor depth perception, defective visual acuity, internal hemorrhage, latent malaria attack, heart attack, hypoxia, hyperventilation, spatial disorientation, vertigo, and aberrant behavior leading to errors of judgment and unsafe acts of commission or omission. The effects of aging on ability in

military aviation are demonstrated. The aim of any training program should be to insure that all personnel are content, socially responsible, and operationally effective at all times. If the relationship between efficiency and safety is continually assessed, the maximum effectiveness should be obtained from any group, whether young or old.

A66-82004
EEG AND REACTION TIME CHANGES DURING INTERMITTENT SENSORY STIMULATION IN HUMANS.
Augusto Fernandez-Guardiola, Carlos Mejia Bejarano, Enrique Roldan, and Dolores Berman (UNAM, Inst. de Estudios Méd. y Biol., Dept. of Physiol., Ciudad Universitaria, Mexico).
Boletin del Instituto de Estudios Medicos y Biologicos, vol. 23, Aug. 1965, p. 101–143. 151 refs.

In the introduction, a review is made of the relation of electroencephalogram (EEG) to habituation and reaction time (RT). Experiments were carried out on 25 human volunteers. The EEG was recorded during iterative prolonged sensory (photic) stimulation with a concomitant recording of the visuomotor reaction time. The evolution of the EEG activity during the test showed that the alpha rhythm passed through five consecutive phases: (a) blockade; (b) disappearance of the blockade; (c) reinforcement; (d) slowing down at rest; and (e) disappearance of the alpha rhythm. The analysis of the evolution of the Visuomotor Reaction Time (VMRT) led to the establishment of marked differences between different subjects. Four types of statistical curves of the evolution of the VMRT are described. Twenty-four out of the 25 subjects submitted to the test showed various degrees of sleep. The relation between slow EEG rhythms and the increase of the RT was highly significant. Changes in stimulation frequency produced VMRT and EEG variations. Slow rates of sensory stimulation (under dominant alpha frequency) induced sleep and lengthening of the VMRT. At this time the application of rapid frequencies (14–20 c.p.s.) induced dehabituation of the motor response, awakening, and EEG signs of the reappearance of an orienting reaction. These facts are discussed in relation to the central regulation of sensory inflow.

A66-82005
MYOGENIC CAUSES OF HEMOLYSIS [MYOGENNE PRZYCZYNY HEMOLIZY].
B. Bula, E. Ziobro, and Z. Sutylo.
Wychowanie Fizyczne i Sport, vol. 10, no. 2, 1966, p. 33–38. In Polish.

The number of erythrocytes in one cc. of blood, and the percentage of hemoglobin in blood and blood plasma were investigated in 20 men, first at rest, and then 15 and 60 minutes after cooling the body with a cold water shower until the appearance of shivers. The same measurements were also made after intensive physical effort (weight lifting training). The number of erythrocytes dropped by 200,000–300,000 in one cc. of blood but returned to the starting level after one hour. The hemoglobin content did not change, but it was found in the plasma. After cooling and physical effort an increase was noted in the resistance of erythrocytes to hypotonic NaCl solutions, probably as a result of an increase in the number of young red corpuscles in the circulating blood after a previous disintegration of the weakest erythrocytes.

A66-82006
DIFFERENTIAL EFFECTS OF COFFEE ON SPEED AND POWER TESTS.
G. A. Lienert and H. P. Huber (Düsseldorf U., Psychol. Dept., West Germany).
Journal of Psychology, vol. 63, Jul. 1966, p. 269–274. 11 refs.

To test the hypothesis of differential effects of coffee on speed and power tests, two groups of 50 subjects each were given 10 standardized tests, one of which was a typical speed test and the other nine of which were partly speeded power tests. Before testing, the subjects of the experimental group were given a cup of Nescafé containing .3 gram of caffeine, while the subjects of the control group did not receive any drink. As predicted from prior empirical evidence and from theoretical considerations, mean performances of the speed tests and the mostly speeded power tests were increased significantly for the coffee group, whereas mean performance in the less or nonspeeded power tests was either not affected or reduced. Results were interpreted in terms of a multiple-factor theory of intelligence by changes in speed factor loading of the tests under caffeine.

A66-82007
EFFECTS OF STIMULUS CONDITIONS AND RESPONSE CONTINGENCIES ON THE DEVELOPMENT AND MAINTENANCE OF A PERCEPTUAL DISCRIMINATION.
Lawrence Simkins (Mo. U., Dept. of Psychol., Kansas City).
Journal of Psychology, vol. 63, Jul. 1966, p. 201–218. 11 refs.
Natl. Assn. of Mental Health supported research.

The purpose of this study was to determine the effects of two classes of variables which may be associated with the development and maintenance of a perceptual discrimination. The two classes of variables were stimulus cues and response consequences. There were three phases in each experiment: base-line, discrimination, and extinction. The results indicated that baseline stimulus conditions (lights vs. no lights) affected rates of response during discrimination but did not have significant effects on error reduction or on the extinction phase performance. The response consequences programmed during the baseline had no significant effect on either discrimination or extinction phase performance. The response contingencies programmed during the discrimination phase accounted for the major differences in performance during both the discrimination and the extinction phases. Although some of the results were accounted for within a discrimination theory framework, there were several inconsistencies.

A66-82008
THE INFLUENCE OF THE DOPA DECARBOXYLASE INHIBITOR Ro4-4602 ON THE URINARY EXCRETION OF CATECHOLAMINES IN COLD-STRESSED RATS.
G. E. Johnson and K. Pritzker (Toronto U., Dept. of Pharmacol., Canada).
Journal of Pharmacology and Experimental Therapeutics, vol. 152, Jun. 1966, p. 432–438. 13 refs.
Grant MRC MA1595.

Male Wistar rats were treated daily with the dopa decarboxylase inhibitor Ro4-4602 (N-(DL-seryl)-N'-(2,3,4-trihydroxybenzyl)-hydrazine), 420 mg./kg. and placed at 27°C. for two days before being transferred to 4°C. for several more days. Analysis of both tissue and urinary catecholamine levels under these conditions allowed a comparison of the effects of Ro4-4602 on catecholamine excretion under resting and cold-stressed situations. Ro4-4602 produced a 30 to 50% fall in the norepinephrine contents of the heart, spleen, and liver at both temperatures. Adrenal catecholamine levels were only depressed by the drug in the cold-exposed rats. Ro4-4602 did not influence the catecholamine excretion of rats

at 27°C., but did significantly diminish the cold-induced increase in norepinephrine excretion. These results suggest that inhibition of dopa decarboxylase does not influence the relatively slow synthesis of catecholamines at 27°C. but does impede the cold-induced increase in norepinephrine biosynthesis. An increase in urinary epinephrine levels accompanied the decreased excretion of norepinephrine in the cold. This increased epinephrine release is presumably responsible for the maintenance of life because most adrenalectomized rats (treated with corticoids) which were administered Ro4-4602 died within three days of being exposed to 4°C., whereas all intact drug-treated rats survived at least six days at this temperature.

A66-82009
EFFECTS OF HYDRAZINE ON FAT TRANSPORT AS AFFECTED BY BLOOD GLUCOSE CONCENTRATION.
David L. Trout (USAF School of Aerospace Med., Physiol. Chem. Sect., Brooks AFB, Tex.)
Journal of Pharmacology and Experimental Therapeutics, vol. 152, Jun. 1966, p. 529–534. 24 refs.

In fasted rats, hydrazine (1.15–1.2 mmol./kg. intravenously, about 60% of the LD_{50}) elevates plasma free fatty acids (FFA), speeds the hepatic secretion of triglycerides into the blood plasma, and within three hr. almost doubles the quantity of liver total fatty acids. The present experiments were performed to ascertain the extent to which these effects are associated with a reduced concentration of blood glucose. The glucose-lowering effect of hydrazine was essentially avoided by feeding glucose or starch or by using fed animals. The FFA-elevating effect was then greatly reduced, but was still observed unless the blood glucose exceeded 1.1 mg./ml. Since the effects of hydrazine on liver total fatty acids and on the rate of triglyceride secretion into the blood could be largely prevented by maintaining the blood glucose level, it is concluded that these effects depend chiefly on plasma FFA concentration.

A66-82010
STUDIES ON SENSORY DEPRIVATION: IV. PART 1. INTRODUCTORY REMARKS AND GENERAL METHODS.
Yukio Ohkubo and Seiro Kitamura (Iwate Med. Coll., Morioka and Tohoku U., Dept. of Psychol., Sendai, Japan).
Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965, p. 1–3.
Min. of Educ. supported research.

As an introduction to a series of papers on the psychological effects of 18 hours of sensory deprivation, the experimental procedures are described. The study consisted of two batteries of psychological tests administered to 23 students before and after sensory deprivation, with strict attention being paid to the amount of time elapsed after sensory deprivation.

A66-82011
STUDIES ON SENSORY DEPRIVATION: IV. PART 2. ELECTROENCEPHALOGRAPHIC CHANGES BEFORE, DURING AND AFTER 18 HOURS' SENSORY DEPRIVATION.
Masahiro Ohyama, Osamu Kokubun (Tohoku U., Dept. of Psychol., Sendai, Japan), and Hisashi Kobayashi (Miyagi Child Guid. Clin., Sendai, Japan).
Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965, p. 4–9. 5 refs.
Min. of Educ. supported research.

Electroencephalographic records from frontal, temporal, and occipital lobes of 20 male subjects before, during, and after 18 hours of sensory deprivation were investigated. Two types of analysis were made: by automatically integrated frequency-analyser and by means of a frequency-histogram, by calculating the numbers of waves of each frequency in a 10-second sample tracing before, during, and after sensory deprivation. The electroencephalographic change after sensory deprivation showed a slight slowing in the alpha and theta bands.

A66-82012
STUDIES ON SENSORY DEPRIVATION: IV. PART 3. RESULTS ON INTROSPECTIVE REPORTS, TIME ESTIMATION AND UNUSUAL EXPERIENCES.
Isao Sato (Tohoku Gakuin U., Sendai, Japan) and Mashiro Ohyama (Tohoku U., Dept. of Psychol., Sendai, Japan).
Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965, p. 10–12.
Min. of Educ. supported research.

The results of subjective estimation of the duration of the sensory deprivation and reports after sensory deprivation are described. In the subjective estimation of the term of sensory deprivation, a tendency of underestimation was clearly confirmed. Subjects rarely reported unusual experiences after 18 hours of sensory deprivation.

A66-82013
STUDIES ON SENSORY DEPRIVATION: IV. PART 5. CHANGES OF "SELF-CONCEPT" UNDER SENSORY DEPRIVATION.
Isao Sato (Tohoku Gakuin U., Sendai, Japan).
Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965, p. 18–23.
Min. of Educ. supported research.

The changes of the "self-concept" under 18 hr. of sensory deprivation (SD) obtained from the "who am I" test were examined. The main findings are as follows: (1) The "past" tense description of the self-concept after SD decreased significantly. (2) the "individual description–self evaluative" responses increased significantly after SD in the experimental group tested immediately after SD by oral method. (3) The decreasing tendency of the "Motivational description-constant" responses after SD were found in the experimental groups tested immediately after SD by oral method and about two hours after the end of SD by writing method. (4) The "Behavior description" responses after SD increased significantly in the experimental group tested after two hours the end of SD by writing method.

A66-82014
STUDIES ON SENSORY DEPRIVATION: IV. PART 6. EFFECT OF SENSORY DEPRIVATION UPON PERCEPTUAL FUNCTION.
Yukio Suzuki, Keiko Fujii (Tohoku U., Dept. of Psychol., Sendai, Japan), and Tadashi Onizawa (Iwate U., Morioka, Japan).
Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965, p. 24–29. 11 refs.
Min. of Educ. supported research.

The effects of 18 hours of sensory deprivation upon the Müller–Lyer illusion, the spiral after effect, the judgment of progressive weights became relatively exact after sensory deprivation, while the results of hearing acuity were not clear. Moreover, the effect of sensory deprivation seemed to be reduced with time and considerably lost after one hour. Individual differences in the duration of the effect of sensory deprivation were found.

A66-82015

STUDIES ON SENSORY DEPRIVATION: IV. PART 7. THE EFFECTS OF SENSORY DEPRIVATION UPON GENETIC PROCESS OF PERCEPTION.

Hitoshi Ueno and Hideoki Tada (Tohoku U., Dept. of Psychol., Sendai, Japan).

Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965. p. 30–34. Min. of Educ. supported research.

The effect of 18 hr. of sensory deprivation upon perceptive organizing ability was investigated in 13 subjects. Subjects were asked to copy the stimulus figures of Bender Gestalt Test under exposure time longer than 200 millisec. The results of the control group were much better than those of the experimental group within the range of the exposure time from 3200 to 12800 millisec., indicating that sensory deprivation prominently deteriorated the perceptive organizing ability and also suggesting that the sensitivity to the stimulus figures became sharp after sensory deprivation.

A66-82016

STUDIES ON SENSORY DEPRIVATION: IV. PART 8. GENERAL DISCUSSIONS AND CONCLUDING REMARKS.

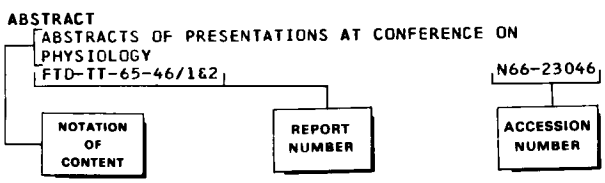
Seiro Kitamura (Tohoku U., Dept. of Psychol., Sendai, Japan).

Tohoku Psychologica Folia, vol. 24, no. 1–2, 1965. p. 35–37. Min. of Educ. supported research.

The results of previous papers concerning 18 hours of sensory deprivation indicated that sensory deprivation deteriorated the higher order functions and facilitated the lower order functions and also suggested that it impaired the cognitive and perceptual processes of the external world, and activated the inner experiences or body-oriented processes. All 23 subjects were tolerant of sensory deprivation. It is suggested that Japanese subjects showed more tolerance than American and Canadian subjects due to differences in sociocultural environmental influences.

Subject Index

Typical Subject Index Listing



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A

B

C

D

E

F

G

H

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Corporate Source Index

Typical Corporate Source Index Listing

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
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AGARD-CP-2 N66-33726

AEROSPACE MEDICAL DIV. AEROMEDICAL RESEARCH LAB. /6571ST/, HOLLOMAN AFB, N. MEX.
MATHEMATICAL MODEL FOR ESTABLISHING TOLERANCE CRITERIA, AND HUMAN IMPACT TEST DATA N66-33753

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
CANDIDATE ATMOSPHERIC COMPOSITIONS FOR SPACECRAFT ENVIRONMENT, AND RAPID DECOMPRESSION EFFECTS ON DOGS AND MONKEYS N66-33743

AEROSPACE TOXICOLOGY RESEARCH ON PROPELLANT PROPERTIES, TOLERANCE LIMITS FOR MISSILE OPERATORS, ENVIRONMENTAL POLLUTION, AND SPACE CABIN ATMOSPHERE N66-33746

EXPERIMENTS TO DETERMINE EFFECTS OF VIBRATION FREQUENCY ON HUMAN PERFORMANCE N66-33749

HUMAN REACTIONS TO INFRASONIC NOISE ENVIRONMENT, AND NOISE SPECTRA MEASUREMENTS OF TURBOJET AIRCRAFT AND SATURN SA-1 N66-33750

DEVELOPMENT OF SEVEN-CHANNEL MINIATURE TELEMETRY SYSTEM EMPLOYING PULSE DURATION MODULATION N66-33756

AEROSPACE MEDICINE CENTER, ROME /ITALY/.
BEHAVIOR OF ARTERIAL OXYGEN SATURATION AND PULMONARY VENTILATION IN DOGS SUBJECTED TO POSITIVE ACCELERATION N66-33744

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
ELECTROPHYSIOLOGICAL PROPERTIES OF CENTRAL NERVOUS SYSTEM - BIOELECTRIC POTENTIALS OF CEREBRAL CORTEX, RETINA, AND SPINAL GANGLION NEURONS IN HUMANS AND ANIMALS, AND NEURON TRANSMISSIONS
FTD-MT-65-210 N66-32686

PROPERTIES AND DIFFERING BIOELECTRIC POTENTIALS OF NEURON TRANSMISSION IN NERVE CELLS N66-32687

ELECTROPHYSIOLOGICAL SIGNAL TRANSMISSION BY FROG AND FISH RETINA NEURONS N66-32688

ELECTROPHYSIOLOGICAL RESPONSE FROM SPINAL GANGLION NEURONS OF FROG N66-32689

PRIMARY BIOELECTRICAL RESPONSES OF ANIMAL CEREBRAL CORTEX TO IMPULSE STIMULATIONS N66-32690

INITIAL BIOELECTRIC POTENTIALS FROM CAT BRAIN HEMISPHERIC CORTEX STIMULATION N66-32691

SECONDARY BIOELECTRIC POTENTIALS OF BRAIN CORTEX AFTER PRIMARY RESPONSE VOLLEY N66-32692

SPONTANEOUS BACKGROUND RHYTHM IN HUMAN AND ANIMAL CORTEX ELECTROENCEPHALOGRAPHIC RESPONSES N66-32693

FACTORS INTRODUCING RHYTHMIC CHANGES IN CEREBRAL ELECTROENCEPHALOGRAPHIC REACTIONS OF CATS N66-32694

CORTICAL RESPONSE RHYTHM CHANGE MECHANICS IN HUMAN AND ANIMAL BRAIN ELECTROENCEPHALOGRAMS N66-32695

COMPONENT IMPROVEMENT OF EXHALATION VALVE FOR HGU-8/P PARTIAL PRESSURE SUIT HELMET
SEG-TR-66-7 N66-33641

METABOLIC PHYSIOLOGY OF MICROORGANISMS, AND EVOLUTION OF FUNCTIONS
FTD-TT-65-616 N66-34242

OXYGEN TOXICITY, SPASM, AND STRYCHNINE INJECTION EFFECTS ON WHITE MICE
FTD-TT-65-966/1&2&4 N66-34273

APPLIED PSYCHOLOGICAL SERVICES, WAYNE, PA.
WAVELENGTH EFFECT ON CONSPICUITY OF FLUORESCENT AND NONFLUORESCENT COLOR STIMULI IN SIMULATED FLIGHT DETECTION SITUATION
NAEC-ACEL-537 N66-34959

ARMED FORCES RADIOBIOLOGY RESEARCH INST., BETHESDA, MD.
ESTIMATION OF PARAMETERS IN MULTIVARIATE EXPERIMENTAL DESIGN AND HYPOTHETICAL APPLICATION TO ESTIMATING FRACTIONAL DOSE RECOVERY EFFECTS
AFRRI-TN66-2 N66-35061

ERYTHROCYTE STEM CELL KINETICS IN RATS AFTER IRRADIATION
AFRRI-SR66-4 N66-35087

ARMY AEROMEDICAL RESEARCH UNIT, FORT RUCKER, ALA.
PEARSON CORRELATION COEFFICIENT AS STATISTICAL MEASURE OF LINEAR DEPENDENCE BETWEEN TWO GROUPS OF RATIO SCALED OBSERVATIONS
USAARU-67-1 N66-34943

ARMY CHEMICAL CENTER, EDGEWOOD, MD.
CONCENTRATIONS OF 35 CRITICAL METABOLITES INCLUDING GLYCOGEN, TREHALOSE, CITRIC ACID CYCLE, AMINO ACIDS, PHOSPHATES, AND ADENINE NUCLEOTIDES
AD-634636 N66-34613

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, WASHINGTON, D. C.
RADIATION EFFECT OF HIGH DOSES OF COBALT 60 ON

B

C

D

E

F

G

H

I

K

L

M

N

T

U

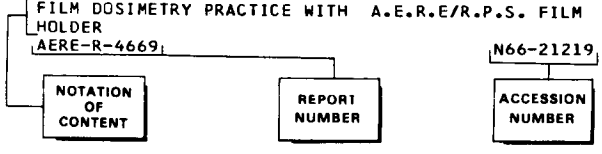
V

W

Y

Personal Author Index

Typical Personal Author Index Listing



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A

ABMA, J. S.
HUMAN PERFORMANCE ON COMPUTER ARITHMETIC TEST - PROGRAMMED INSTRUCTION
AMRL-TR-65-227 N66-35082

ABRAMOV, I.
RESPONSE CHARACTERISTICS OF LATERAL GENICULATE CELLS OF MACAQUE MONKEY, DISCUSSING HUE, SATURATION AND BRIGHTNESS ENCODING IN PRIMATE COLOR VISUAL SYSTEM A66-36946

ABYZOV, S. S.
MICROORGANISM CHANGES UNDER EXTREME ENVIRONMENTAL FACTORS, NOTING POSSIBLE MARTIAN LIFE AND METEORITIC ORGANIC COMPOUNDS A66-35574

ADAMS, N.
ACCURACY IN ROUTINE ASSESSMENT OF RADIATION DOSES TO PERSONNEL BY FILM BADGES
AHSE/RP/-R-62 N66-33109

ADAMS, T.
PRIMARY SHIFT OF PHASE OF CIRCADIAN PERIODICITY EFFECTED BY TIME DISPLACEMENT FOR PHYSIOLOGICAL FUNCTIONS A66-36374

ADEY, W. R.
SPECTRAL ANALYSIS OF HUMAN EEG GENERATORS IN POSTERIOR CEREBRAL REGIONS A66-37604

SPECTRAL ANALYSIS TECHNIQUES AND PATTERN RECOGNITION METHODS FOR AUTOMATIC PROCESSING OF ELECTROENCEPHALOGRAPHIC DATA
NASA-CR-77039 N66-33387

TECHNIQUES AND BIOINSTRUMENTATION FOR BEHAVIORAL AND NEUROPHYSIOLOGICAL STUDIES OF CHIMPANZEES AND APOLLO APPLICATIONS
NASA-CR-77386 N66-35021

AINSWORTH, E. J.
INJURY ACCUMULATION AND RECOVERY IN SHEEP EXPOSED TO COBALT 60 GAMMA RAYS
USNRDL-TR-998 N66-33637

AIZAWA, T.
EFFECTS OF SODIUM AND POTASSIUM SOLUTIONS AND CARDIORESPIRATORY STIMULANTS ON CEREBRAL CIRCULATION, METABOLISM, AND ELECTRICAL ACTIVITY IN CATS
J-213-6 N66-35120

AJELLO, M. T.
ACTION OF TRITON IN THE RAT POISONED WITH CARBON TETRACHLORIDE A66-81917

ALBERS, C.
RESPIRATORY CHANGES IN DOGS IN RESPONSE TO VARIOUS ENVIRONMENTAL TEMPERATURES A66-81885

ARTERIAL-ALVEOLAR CARBON DIOXIDE TENSION DIFFERENCE UNDER DIFFERING RESPIRATORY CONDITIONS IN DOGS A66-81886

ALEXANDER, L. T.
VISUAL CUES IN MOTION PERCEPTION DURING TARGET TRACKING TASK A66-81876

ALEXANDER, T. A.
FABRICATION OF SOLID STATE CIRCUIT TO PULSE XENON LIGHT SOURCE AND EQUATION FOR PREDICTING THERMAL RADIATION RETINAL BURNS IN RABBITS
AD-634027 N66-33620

ALFORD, B.
EFFECTS OF VERY LOW FREQUENCY TONES ON HUMAN AUDITORY THRESHOLDS A66-81946

ALLEN, J. R.
EFFECT OF HIBERNATION ON WEIGHT, MITOCHONDRIAL NITROGEN CONTENT, AND ENZYMATIC ACTIVITY OF BROWN FAT AND LIVER OF GROUND SQUIRREL, CITELLUS LATERALIS A66-81888

ALLISON, T.
HUMAN SOMATIC EVOKED RESPONSES IN WAKEFULNESS, SLOW WAVE SLEEP, AND RAPID EYE MOVEMENT STATE A66-81976

ALONSO, G. L.
METHOD FOR MEASURING BONE ACCRETION RATE, EXCHANGEABLE BONE FRACTION SIZE, AND RADIOCALCIUM REABSORBED FROM BONE IN RATS A66-81927

ALTMAN, I.
PERFORMANCE CHARACTERISTICS OF SMALL HUMAN GROUPS A66-81914

AMDUR, M. O.
RESPIRATORY ABSORPTION DATA AND SULFUR DIOXIDE DOSE-RESPONSE CURVES IN RABBITS AND GUINEA PIGS A66-81923

AMMON, H. P. T.
METABOLIC CHANGES IN THERMOREGULATION OF MICE WITH TREATMENT BY ANTIADRENERGIC, PROPRANOLOL A66-81883

ANDERSON, D. P.
INFLUENCE OF CARBON DIOXIDE INHALATION ON CHICKEN AND TURKEY RESPIRATORY TRACT - RESISTANCE TO INFECTION WITH NEWCASTLE DISEASE VIRUS A66-81947

ANDERSON, S. G.
CORNEORETINAL POTENTIAL IN MAN AS RELATED TO VISIBLE RADIANT ENERGY WITH AND WITHOUT INFRARED RADIATION A66-81989

ANDERSON, T. A.
ADRENAL AND BRAIN ASCORBIC ACID, ADRENAL WEIGHT, EOSINOPHIL COUNT, AND SERUM CHOLESTEROL LEVEL IN RATS AFTER NOISE STRESS A66-81924

ANDREW, I. D. C.
COCKPIT DISPLAY SYSTEMS AND FLIGHT INSTRUMENTS, AND HUMAN ENGINEERING - BIBLIOGRAPHY AND ABSTRACTS

B

C

D

E

F

G

H

K

L

M

N

R

S

T

W

Y

Z

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